

REPORT
OF
The Third Indian
Industrial Conference
HELD AT SURAT
ON
the 30th December 1907.



*Published by the General Secretary,
Indian Industrial Conference, Amraoti.*



Orders :

PRINTED BY THOMPSON & CO., AT THE "MINERVA" PRESS,
33, POPHAM'S BROADWAY.

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*Letter from His Excellency Sir George Clarke,
Governor of Bombay, to the President of the
Third Indian Industrial Conference.*

28th December 1907.

DEAR SIR,

Every one who has the interests of the people of India at heart must wish to promote the development of industries as the necessary complement of agriculture on which the country is now too dependent.

In Western lands, industries have been built up mainly by the initiative of individual citizens. It is always difficult for a Government to introduce new forms of industrial activity, which are apt to prove delicate plants requiring expensive culture. The soundest industries are those which spring up from the natural aptitudes and requirements of the people. Governments can help such industries in several ways, as soon as they have begun to assume an organised form.

I am, therefore, hopeful that your important Conference may be able to throw light on the industrial possibilities of India, and to foster the spirit of self-help which is essential to the healthy development of human energy.

May I ask you to accept my most cordial wishes for the success of your deliberations, and to,

*Believe me,
Yours very faithfully,
G. S. CLARKE.*

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INTRODUCTION.

‘Thought which has been merely productive of further thought is not sufficient. It is in the practical application of thought—its conversion into practical energy—on which the future of the country depends. Will her people rise to the occasion and draw upon the vast fund of potential wealth and energy which nature has so lavishly provided her with? She *can* do so and it is the ardent hope of all well-wishers of India that she *will* do so.’—**H. H. Macleod, Esq.**, (Paper on ‘The Coal Mining Industry of India,’ pp. 230-1 of Report.)

‘No progress is possible in the absence of material prosperity. No moral development, no intellectual achievements have taken place in countries where the material condition of the people is at a low level and where consequently life is a bundle of pessimism, inertia and apathy. We must not rest until temples dedicated to Saraswati and Viswakarma, *i.e.*, colleges and polytechnics, outnumber all the temples, mosques and churches which minister to the supposed spiritual needs of the people. Our religious charities must be directed towards supplying us with brain-power. On brain-power depends the regeneration of India, her prosperity and integrity and also her salvation.’—**Professor T. K. Gajjar** (Address of Chairman of the Committee, p. 20 of Report.)

The Third Indian Industrial Conference was to have been held at Nagpur along with the Twenty-Third Indian National Congress, but owing to untoward events the *venue* was changed to Surat in the month of November 1907. The citizens of Surat had thus barely six weeks in which to make the requisite arrangements for holding a successful session of the Conference. Let it be said to their lasting credit that with a public spirit almost unparalleled in this country they rose equal to the occasion and left nothing undone to make the session a success. The Conference was held in the beautiful *mandap* of the Congress on the 30th of December 1907.

Professor T. K. Gajjar opened the proceedings in his capacity of Chairman of the Committee with an address entirely worthy of his high reputation in the world of science and industry. As was to be expected, the organiser of the Kala-Bhuvan of Baroda and the Techno-Chemical Laboratory

of Bombay laid just emphasis on the paramount need of education for industrial development. In tracing the history of the Conference movement Professor Gajjar incidentally remarked on the deficiencies of the Industrial Exhibitions which till last year were an accompaniment of the Congress since 1901.

‘It must be said that they were not pervaded with the spirit and insight which advanced industrial nations have manifested in the exhibitions held by them. Instead of making arrangements to show the processes of manufacture our raw products pass through in foreign countries, or suggesting lines of development for our existing industries, we collected samples of articles manufactured in India to give an opportunity to the agents of foreign manufacturers to take minute notes of them and prepare their cheap machine-made imitations to replace our manufactures in our own market. These remarks will, I hope (said Professor Gajjar), be borne in mind when such exhibitions are organised in future.’ (P. 7.)

This, it ought to be stated, represents one view which might be urged of the Industrial Exhibitions which have of late been held in India. The other view is represented in the following passage of the President, Dewan Bahadur Ambalal's address :—

‘The idea that the Exhibition is a mere show is not borne out by facts. Producers exhibiting their goods have obtained a degree of publicity for them which would have been otherwise hardly obtainable. Further, it makes the materials for a comprehensive directory of Indian goods easily accessible. While a considerable proportion of the visitors must be sight-seers, there is always an important but increasing minority who benefit by it even commercially. A few foreign rivals may perhaps derive advantage from it. But industrialism is now an international race, in which the fittest will win. At the same time we are always ready to adopt suggestions for making it widely beneficial.’ (P. 38.)

Speaking of the Conference itself Professor Gajjar referred to an unique advantage of it in the following terms :—

‘This platform of science and industry makes room for all classes of the people to meet together, laying aside personal ambition, political animosity, religious prejudices and state officialism, so that they could all combine in an unanimous effort to raise every class in society to a higher condition of personal excellence and usefulness, and extinguish class distinctions by diffusing equal education.’ (P. 7.)

Proceeding, the learned speaker drew a sharp distinction between the development of a country and that of its people.

'For example, the Mysore Government is generating electric power in the Cauvery at a tremendous outlay of its people's money, and has leased it to a foreign Syndicate to exploit the mineral wealth of the State in return for a small royalty. The resources of the State are doubtless developed thereby, but its people have not been profited to the extent they ought to have been, and have not acquired any aptitude for scientific mining or for making use of the natural forces.' (P. 8.)

'The exploitation of America, Africa and Australia has resulted in the extinction or serfdom of the original inhabitants. The present Amir of Afghanistan fully realises this difference, and does not grant concessions to foreign capitalists to work the rich mineral deposits in his country, but engages foreign experts to train his subjects to develop the resources of the country themselves. This shows that the Amir cares more for the permanent interests of his subjects than for the temporary gain to his treasury from concessions to foreign syndicates on easy terms.' (P. 9.)

• It will be in the recollection of the readers that the Honourable Sir (then Mr.) Vithaldas Damodher Thackersey expressed a similar opinion in his Presidential address at the previous Conference at Calcutta. We believe there will be a general disposition to agree with Professor Gajjar when he added that the charge for this neglect of duty does not wholly attach to the Government and that the people must share it.

Speaking of the movement for the boycott of foreign goods, Professor Gajjar said:—

'I do not wish to assert that boycott is altogether impracticable or it is altogether useless. What I do wish to point out is that boycott can never by itself solve an industrial problem. * * Scientific knowledge, technical skill, and industrial enterprise and organisation—these are the true remedies, the only positive forces we can rely on to develop our industries.'

Professor Gajjar urged strongly the development of the oil industry and of chemical industries. The chemistry of bye-products has opened up new and unexpected avenues of industries in the West. The possibilities of the mining industry did not escape his attention either, and his plea for the creation of an Institute of Mining has many supporters in the country. Indeed, in the year 1901, the Indian National Congress urged on the Government the establishment of a

The rest of Professor Gajjar's speech was devoted to advocacy of the need of scientific and technical education based on a wide spread of general education. 'Leave no stone unturned to increase the brain-power of our nation,' was the burthen of his song. 'Without universal education there is no salvation for us. We must undergo an intellectual revolution ; our outlook on life and our present conception of mundane duties must be modified, if we want to remain as a nation and a nation full of youth and prosperity as in the days of yore. "Educate, educate, educate" must be the cry heard on all sides. 'The people should not wait for Government initiation, but do whatever they can independently.' Let us not wait for large funds, but begin with whatever sums we get from our people. * * Education is a religious duty, and let us gird up our loins to perform it to the best of our abilities.'

The Chairman of the Committee concluded his speech with the following inspiring exhortation :—

'Let us thoroughly and systematically carry out the conclusions we arrive at. We have the necessary means present in abundance in our land ; we have capable men in our ranks ; we have the guidance offered by the history and experience of England and other nations ; why should we then hesitate to work out our industrial salvation ? If we neglect the present opportunities, we shall have to pay a very heavy toll in future for mere existence. Let this dismal and depressing prospect spur us on to action, to stimulate and accelerate our industrial progress. If we will, we shall bring about our industrial regeneration. With knowledge, with self-confidence, with determined action and with united endeavour in the sacred cause of our Motherland, let us, ladies and gentlemen, resolve to work out our own regeneration. (*Loud cheers.*)' (P. 21.)

Dewan Bahadur Ambalal Sakerlal Desai, of Ahmedabad was the President of the Conference. He is, as Professor Gajjar said in his speech 'a distinguished alumnus of the Bombay University, a staunch political leader of Gujarat and one of the captains of her flourishing mill industry. He has high intellectual attainments, varied experience of life, keen and penetrative grasp of our national problems.' The President delivered an able, thoughtful and practical address which shows the characteristics mentioned by Professor Gajjar, and it must be helpful to those who are eager

to embark on industrial enterprise. His statement of the fundamental facts of our economic situation can hardly be improved upon :

(1) Wide-spread and chronic poverty among a large proportion of the population ; (2) dense ignorance of the masses ; (3) an abundance of raw materials ; (4) absence of scientific and technical knowledge and practical skill ; (5) a low state of commercial enterprise ; (6) a large deficiency of capital. The question that we are called upon to consider is how to evolve a state of widespread industrialism out of the conditions just postulated.

‘ We must depend for our immediate progress on our resources as they now exist.’ The want of capital is our chief desideratum. Dewan Bahadur Ambalal’s solution of the difficulty would be the creation of a public opinion in favour of the diversion of a portion—say a fourth—of the rupee debt of the Government of India held by Indians, and of a half of the amount deposited in the Postal Savings Bank, which together would amount to about 20 crores of rupees, into channels of trade and industry. Then ‘ an amount of strength would be imparted to our industrial activity, of which we have at present no adequate conception.’ The best means of compassing this end would be the establishment of banking institutions all over the land : ‘ there is no reason why every town of importance should not have a bank of its own.’ But all that is feasible in the way of organising Indian capital might be done, and yet Indian productive industry will require more capital than is available in the country itself. Hence foreign capital should be freely borrowed, only care should be taken that too much price is not paid for it.

Dewan Bahadur Ambalal has great faith in the *Swadeshi* movement and naturally he devoted a good portion of his address to an exposition and a vindication of it.

‘ The aim of this movement is the establishment of new industries in India, by means of Indian capital if possible, so that the Indian people may be, as far as is practicable, self-contained and independent of the foreign imports that now flood the land.’ (Pp. 26-7)

‘ The *Swadeshi* movement ultimately seeks to call into existence the directing capacity, the technical skill, and the requisite capital, so that our own labour and money may convert our raw materials into the commodities which we now import.’ (P. 27.)

'There is nothing in [the methods of the promoters of the movement] that any honest man can seriously object to. The economic ideas of men differ in many points, and a difference on this one is allowable. But no candid man can stigmatise these patriotic efforts as dishonest. They are perfectly legitimate.' (P. 27.)

'But * * they are not only justifiable but urgently needed. * * * The *Swadeshi* propaganda is in its essence an endeavour to reinforce the cause of Indian industries by enlisting the Indian patriotic sentiment on its behalf. It is difficult to see how any objection can exist against such a move. Organised voluntary efforts are specially needed in all departments of national activity. The *Swadeshi* movement is the application of this principle to that of national industrial regeneration.' (Pd. 27-8.)

'These gratifying results (of the industrial activity of the last two years) are largely attributable to the *Swadeshi* propaganda, and to the *Swadeshi* spirit which it has aroused. In the face of these results it is not reasonable to cavil at the *Swadeshi* movement.' (P. 29.)

'Now it is permissible to enquire why a nation situated like ours, and deprived of all means of enforcing its will by collective action, may not seek to extend its industries by appealing to a higher sentiment than avarice, *viz.*, Patriotism. Even Royal personages have commended such an appeal and enforced it by their example.' (P. 30.)

The President next drew attention to the important subject of railway transport which 'has not received the attention it deserves.' 'The delays in the dispatch and handling of goods after arrival are often scandalous.' The railway rates are too high and need to be reduced in the interest of Indian manufactures. Readers of Sir Frederick Lely's book—*Suggestions for the Better Governing of India*, will remember how strongly he laid stress on the necessity of such reduction. In his paper on 'The Scope and Method of an Industrial Survey' (pp. 40—46 of Report), Mr. A. C. Chatterjee, I.C.S., the able officer who is in charge of industrial survey in the United Provinces, also refers to the subject in the following terms:—

'One of the most interesting and difficult questions that have cropped up in connection with my inquiries in the United Provinces is that relating to railway freights. Many of the existing industries complain that it is hopeless for them to find a market for their produce in the large towns on the seaboard because railway freight, even at the lowest rates over long distances in the country, is higher than sea freight from competing countries like Japan and Germany.' (P. 44.)

The desirability of having a common currency and uni-

form weights and measures in the country was the next subject discussed in the President's address. 'The necessity of developing the domestic commerce of our vast country makes the question of a common currency and common weights and measures one of national importance.' The agricultural industry, the cotton industry, iron, coal and manganese, the sugar industry, jute and silk, leather, paper and other industries, were next passed in review. On the question of the excise duty on cotton goods the President said :

'The public can now justly demand that the excise duties on cloth, which have trebled during the last ten years, and now amount to nearly 31 lakhs of rupees per annum, should be abolished. The increasing revenue from excise on cotton cloths involves a new danger to the industry, to which the attention of all publicists might be invited. At present the interests of Lancashire form the sole pretext for the impost. But if the revenue from it grows at its present rate, considerations of finance are likely to be utilised for its continuance. It will be said that the amount is too large to be at once remitted. This is an additional reason for taking concerted action now to get this obnoxious tax removed.' (P. 33.)

The question of creating home industries for our rural areas was next discussed in brief.

'For more than six months in the year almost the whole agricultural population of unirrigated tracts is absolutely without any employment. It might greatly improve their material condition if some handicrafts suitable to their needs could be successfully introduced into our rural areas. The hand-loom may answer the purpose in many cases. Knitting and lace-making also suggest themselves. The matter is very important, and suggestions or papers dealing with it ought to be invited.' (Pp. 35-6.)

Speaking on education the President dwelt on the absolute necessity of imparting a sound elementary education to the labourer if his condition was to be really elevated, on the need of technical education on a broad scale—care being taken that always there was a living connection between the technical school of a district or province and its actual or projected industries—, and on the need of a school or college providing a full commercial course.

In concluding his address Dewan Bahadur Ambalal made the observations quoted already about the useful purpose which exhibitions of indigenous products served in this country and he suggested that their organisation might be taken up by the

Conference. He further observed that the Conference might 'encourage the acquisition of specialised practical knowledge' by the offer of scholarships and prizes. And he addressed this exhortation to the assembled delegates, and through them to his countrymen at large: 'Let us never forget that Nations are made by themselves. In this as in all our activities, self-help and self-sacrifice ought to be our watchwords.' *

According to Dewan Bahadur Ambalal 'the very able papers written by gentlemen possessing special expert knowledge which this Conference has been the means of evoking form by themselves a mine of valuable information.' Of such papers there was a goodly number in connection with the Surat Conference as at the two previous sessions. The promoters of the Conference must consider themselves fortunate in receiving the cooperation of so many qualified men—from among Europeans and officials not less than from among Indians and non-officials—year after year. By their contributions to the important and difficult problems on the successful solution of which depends to no small extent the future of Indian trade and industry, they have really placed the people of India under great obligation to them.

The first of the papers that will be found printed in the present Report is that of Mr. A. C. Chatterjee, I.C.S., on Industrial Survey, to which reference has already been made. What should be the aim of an industrial survey? According to Mr. Chatterjee—

'Its ultimate object ought to be to indicate the economic possibilities of the province. Briefly, we should study the resources of the province in soil and raw products, labour both skilled and unskilled, capital, communications and facilities for trade. We have then to ascertain the wants of the people in the shape of finished articles, or, in economic language, the demand that exists among consumers. The surveyor has then to endeavour to find out whether the demand is or can be locally met, and also to suggest what would be the best method of utilising the surplus raw products of the province.'

Going into some detail Mr. Chatterjee pointed out that in studying the industrial condition of a tract it was imperative to take stock first of all of the raw products both actual and potential. Such products may be either mineral or agricultural. The next point to bear in mind is the labour supply,

Nor can the question of capital be neglected in an industrial survey of any part of the country. 'Each industry will have to be considered in detail, and a careful study will have to be made whether production on a large scale is necessary or mere hand-power will suffice.' Mr. Chatterjee thinks that a very large extension of the cooperative movement is necessary among the industrial population of this country, and his opinion is that there are greater possibilities in industrial cooperation than even in agricultural cooperation. At present there is no one to tell the craftsmen what is the style of goods which is now in demand and what articles the craftsmen should produce to suit the altered conditions of the trade. 'In an industrial survey an attempt should be made to determine if any such agencies can be established for the different industries. I need hardly say' Mr. Chatterjee added, 'that in a matter like this a very great deal can be effected by a non-official organisation like the present Conference and smaller societies affiliated to it.' Facilities of communication cannot be excluded either from the purview of an industrial survey. Then there is the question of consumption. Almost every knowing man takes the same view as Mr. Chatterjee when he said in this connection.

'I think in the present stage of our industrial development it may be taken as an axiom that our first endeavour should be to manufacture for the home market. * * A glance at the trade returns of India will convince any one that there is a considerable leeway to make up in the home market before thinking of foreign markets.'

We should therefore, as Mr. Chatterjee remarked, carefully analyse the traffic returns of the province and observe what articles at present imported from outside can be manufactured with raw materials obtainable locally.

Mr. John Wallace, editor of that informing and useful publication, the *Indian Textile Journal*, discusses the subject of 'Technical Education for the Workman.' (Pp. 46—58.) The following passage lays bare the glaring defects in the Indian workman which can only be remedied by suitable education :—

'In one large house, facing the Elphinstone College, all the joinery is finished with the jack plane, many of the joints in shutter frames would admit a half anna coin, the jute mills rattle loose, and the

locally made hinges are all deficient in wearing surface. Many of the hinges are not in line. The work of the plumbers and electric fitters is exceedingly rough although their material appears good, the painters seem quite incapable of mixing the same shade continually, and the national lack of standard of excellence is just as obtrusive now as before. An Indian cannot paint a window frame without painting the glass, and if obliged to clean the glass, he will use sand paper or emery cloth, which ruins the surface. He will varnish a dog-cart with his fingers dipped in varnish, or paint doors with a piece of rag, instead of using a brush, leaving clots of paint in the corners. If he paints or colour-washes a wall, he leaves the floor all foul with droppings, and he rarely does any repair work without damaging, in some way, the building in which he works. The Indian mason continues to build walls with stones of a pyramidal shape, the base forming the exterior surface, a most vicious practice, and the cabinet maker has so little confidence in his own jointing that he ties the legs of tables together to keep them from coming loose. Slovenliness and imperfect knowledge of his craft are the characteristic of his work, and his outfit of tools is that of a man who will buy or make nothing that he can possibly do without, and who has no regard for time as an element of cost. (Pp. 46-7.)

Mr. Wallace's opinion is that the Indian artificer has no standards of good workmanship and that he will give the smallest possible return for his pay.

'All well-wishers of India desire to see a better use made of the raw products that are exported at present in such quantities. Materials to produce paints, varnishes, leather, canvas, cordage, textiles, drugs, oils and metals, many of which return in a manufactured state, might all be dealt with here if workmen were more reliable. It is they who determine the final quality and finish of any manufacture, and if they are stupid, careless, irregular, migratory and improvident, no talent of master or manager can avert the deterioration of the product. We must, therefore, give such attention to the education of the workman as shall improve his working capacity.' (P. 48.)

Mr. Wallace considers at some length the quality of the training that should be imparted to the workman, and without necessarily concurring in all the opinions he expresses one will have no difficulty in seeing that the Indian workman will greatly increase in efficiency if he receives such instruction.

Mr. Ishwar Das Varshini of Aligarh writes a long and an informing paper on the need of a 'Technological College for India.' (Pp. 317-34.) The readers may remember that

Dewan Bahadur K. Krishnaswami Rao of Madras urged the same need in a paper contributed to the Benares Conference. Mr. Varshini rightly points out that no number of scholarships tenable for education in foreign countries can take the place of a national technical institution. 'We must start technological institutions in our own country, where the students may receive the best training that may be possible under the circumstances and at the same time be familiarised with the quality of the raw materials, labour supply, etc., of the country. After acquiring such knowledge they may profitably go to some foreign country for completing their education.' The information contained in Mr. Varshini's paper on technical education in Germany and the proposals he makes on the branches of industry in which education should be imparted in an Indian technological college will undoubtedly repay perusal.

* Messrs. K. Subramani Aiyar (pp. 58—71) and C. Gopal Menon (pp. 71-81) write on commercial education. Mr. Subramani Aiyar is a man of great experience and an acknowledged authority on the subject. He points out rightly that commercial education will not deserve the attention claimed for it, if commercial institutions are merely intended to divert young men from one kind of quill driving to another kind of quill driving. 'The real and chief object of commercial education is to enable our youths to become merchants, traders and bankers.' Mr. Subramani Aiyar eagerly pleads for the institution of University degrees in commerce and the affiliation of commercial colleges to the University. In the following he briefly indicates the scope and extent of University courses in commerce :—

'A sound knowledge of English and of at least one Asiatic and one modern European language will form an essential feature of the University course in Commerce. Among other subjects will be commercial mathematics and accountancy, mercantile law and practice, the history, science and practice of banking, currency, foreign exchanges, economics, economic geography, the history of commerce, industry and manufactures, the theory and practice of statistics, railway problems, transport, public finance, industrial development, and the organization of industries. The scope and extent of education that a young man would have received at College by the time he takes the bachelor's degree in commerce would be neither more nor less than the training received by the Bachelor of Arts,' etc. (Pp. 67-9.)

Other problems in connection with commercial education that demand attention are improvement in the organisation of the commercial schools and colleges now in existence in different parts of India, the formation of vernacular commercial schools for the benefit of those that discontinue their studies on passing through the vernacular or primary department, and the establishment at the head-quarters of each province of a central commercial institution which would have distinct departments for imparting higher, secondary and vernacular commercial education and in which provision would be made for training secondary and vernacular commercial teachers for smaller schools in the mofussil. Mr. Gopal Menon also insists on the necessity of instituting commercial degrees in connection with Indian Universities.

The very able manager of the Empress Mills, Nagpur, contributes a short but eminently suggestive paper on the Labour problem (pp. 81—4). In Mr. Bezonji's opinion there is 'no room for doubt that there are immense potentialities for a plentiful supply of comparatively cheap labour in numerous congested areas. Only, it needs sustained and organised efforts to coax it to leave the paternal home where it half starves, and migrate to industrial centres affording more lucrative pursuits. The first essential to success in this direction must be a thorough combination and association among the employers themselves.' He says from personal experience that individual employers find it practically impossible to do the recruiting themselves each in his own way. He suggests that each industrial centre should have a society of its own, that it should have a practical and thorough organisation under which reliable recruiting agents might be appointed. But even for such a scheme to succeed, Mr. Bezonji is of opinion that our factory system specially, and other industrial works generally, are too exacting and unattractive. The cause and the cure of the 'labour' difficulties are stated thus by him :—

'The hours of work are too long, the conditions of life demoralising and destructive of domestic happiness, however little that may be, the imported labour, that is the new comers, accustomed to open air, little work, and stay-at-home habits, on being introduced into a new way of life, are instantly bewildered by the moving machinery, the noise all round, the stuffy atmosphere, and, what is most repellent, the confinement from

dawn to dusk and even up to late at night, more frightful than even jail life. No wonder the first impulse, even for the starving people, is to run away, regardless of consequences. Shorter hours of work, regular holidays, fairly good wages, well ventilated factories provided with sanitary accessories, pure drinking water, and healthy dwellings are necessary to keep the operatives in such a state of health and ease, that they may show interest, if not zeal, in their work, and may not wish to leave it. Pensions, provident funds, leave rules would make the workers highly contented.' (Pp. 83-4.)

With Mr. Bezonji's paper should be read Mr. Saklatvala's on 'The Present Condition of Labour in the Textile Industry, and the Restriction of Working Hours in Mills' (pp. 347-55). Examination of the actual condition of labour in our mills leads him to the conclusion that textile mills fail to attract intelligent and healthy labour, though other occupations and industries are not similarly afflicted, because of the 'unpleasant and unhealthy' conditions under which the textile industry in India in general is at present carried on. 'If the existing conditions as to light, ventilation, and other sanitary arrangements are altered and improved, and reasonable hours for work appointed, say 11 hours a day, there is no doubt the textile industry will attract labour, and the "labour problem" put an end to for a long time to come.' The feeling in the country, however, seems to be that the recommendations of the Factory Labour Commission go as far as the circumstances really require.

Next we have papers by Mr. M. R. Bodas of Bombay (pp. 84-8) and Mr. Maganbhai C. Patel of Ahmedabad (pp. 342-7) on 'Industrial Banks.' Mr. Bodas puts the case well in the passages given below :—

'In a country like India, where capital is usually stationary and trade comparatively sluggish, a financing agency like a public bank is an absolute necessity to accommodate enterprising traders and supply the needs of current business.' (P. 85.)

'The necessity has long since been recognised in larger centres of commerce, and cities like Bombay, Calcutta, Delhi and Lahore already boast of several organised and well-conducted Indian banks. But the smaller towns and rural districts equally want them. The needs of the agricultural classes who form the bulk of the population in villages may be partially satisfied by the new cooperative credit societies initiated by Government ; but no such concerns can really be proper substitutes for a well organised bank with a large reserve capital.' (P. 85.) 'Special industrial banks are necessary to give financial help to ensure proper organisation of new industries.' (P. 86.)

It seems it came out in a recent trial in Germany that almost half the factories there are worked by machinery that is given on loan by the makers, who agreed to receive the price in instalments. Such help is much more required by many people in India 'who know valuable processes, which cannot be turned to account for want of means.' 'An industrial bank will help these men by timely help and thereby become the mother of so many different industries.' Mr. Maganbhai wants industrial banks to be started at district head-quarters with a capital of two or three lakhs of rupees and on more or less the same lines as cooperative credit societies. He also explains the special concessions that might properly be extended to them by Government.

The immense possibilities of the cooperative credit movement have always appealed to the promoters of the Indian Industrial Conference, and, as in the case of the Benares and Calcutta sessions, there were admirable papers on the subject contributed to the Surat Conference. One (p p. 88—98) was by Mr. W. R. Gourlay, at present Director of Agriculture in Bengal. He has made a special study of the cooperative credit societies of Germany and other continental countries, and to the enthusiastic efforts put forth by him as Registrar of Cooperative Credit Societies must be attributed to no small extent the progress in this direction achieved in the large province of Bengal. Mr. Gourlay points out that, the great necessity of Indian agriculture being cheap credit, the usefulness of the Agricultural Departments of Government will be enormously curtailed unless the good and careful agriculturist can obtain capital at a rate not exceeding $12\frac{1}{2}$ per cent. At present, however, the agriculturist is being financed at a rate of interest varying from 25 to 50 per cent. To quote Mr. Gourlay—

'Everything is being done to build up an Agricultural Department in each Province in India which will compare favourably with similar departments in other great agricultural countries. The present scheme for development will not be fulfilled for five or ten years yet, and therefore now is the time when we must put forth every effort to cheapen credit, so that the labours of the Agricultural Department may do the maximum of good to the community. Hence the importance of the subject with which we are dealing. The cheapening of rural credit must be the foundation of all agricultural improvement.' (P p. 88-9.)

Perfectly so ; but it may be doubted whether small coope-

rative credit societies alone, however numerous they may be, will go to any extent in solving the allied problems of agricultural indebtedness and agricultural credit. They will have to be supplemented and aided by agricultural banks on a fairly large scale as pointed out in the fourth resolution of the Surat Conference. It were well if the Government of India and the several Provincial Governments concluded their prolonged consideration of the subject and made up their mind to start operations at an early date. To come back, however, to Mr. Gourlay and his paper. The exposition of the subject is very lucid and it has been dealt with with the confidence springing from knowledge and ability. Both he and Mr. Campbell, Registrar of Cooperative Credit Societies, Bombay, who gives a most interesting account of their growth in the Western Presidency (p p. 98—108), make an earnest appeal to those who have the opportunity to help a good cause to come forward to spread the idea among the people and start societies where none exists at present. 'We want help,' says Mr. Gourlay.

'We do not want money from Government to assist us, we want the willing cooperation of those who have the welfare of the people of this land at heart to help us in spreading a knowledge of the principles and to guide and counsel the members of new societies. Money will come but we want men who love the country and its people : men who are willing to give their time and their labour towards helping their struggling brethren : men who believe in this work and who are in entire sympathy with the people. There can be no grander work for a young man than this. It demands no great power and no great learning ; it demands only sympathy and patience. It is the grandest work that a man can take up for his country.' (P. 98.)

Mr. Campbell pleads for men as well as capital : men like the Honourable Sir Vithaldas Thackersey and Mr. Lalubhai Samaldas—names honourably associated with the work of the Industrial Conference—, among others, who have advanced from time to time the needed capital to individual societies at very easy rates.

Mr. Jogindranath Samaddar of Jessore, an earnest worker, contributes a third paper entitled 'Cooperative Credit in Agriculture' (pp. 335—42). He enforces the plea put forward by Rai Parvati Sankar Chaudhuri at the Calcutta Conference, in favour of cooperative grain banks, or *Dharmagolas* as they are called.

We pass on to Dr. Harold Mann's excellent paper on 'Agricultural Development in Bombay and the Work of the Department of Agriculture' (pp. 108—18). No one who knows Dr. Mann or his work need be told of the wholly admirable spirit in which he has set about his work as Principal of the Agricultural College, Poona. The paper under notice, as might be expected, breathes earnest sympathy with the people from beginning to end. We will not attempt here a summary of the contents of the paper : we will only call attention to the emphasis that Dr. Mann justly lays more than once, on the test by which alone the utility of the Agricultural Department has to be judged, *viz.*, the bringing of its work to the knowledge and to the door of the cultivating ryot. Dr. Mann says in concluding his paper :

'The idea that pervades the Department now, I believe, and which must pervade it, if it is to be of the use we want it to be, is that it succeeds just in so far as, and no more than the agriculture of the Presidency is improved. Of all things I do not want it to be thought of as a Government institution standing apart from the people. We want it to be useful, and, in my own mind, only by its usefulness can the expense, the energy, and the time required for maintaining the Department be justified.* * I insist on the essential aim of the Department of Agriculture in Bombay. We do not want for a day to be considered as a Government institution. We exist simply and solely to benefit the cultivator of the Presidency. I want to leave Bombay to-morrow if I cannot do something to help the province. I do want to insist on that with all the earnestness that I have.' (P. 118.)

Mr. Stanley Reed, the able editor of the *Times of India*, who in the next paper discussed 'The Desirability of commencing Agricultural Exhibitions in the Bombay Presidency, especially at Surat and Poona' (pp. 119—22), also dwells on this, what he calls 'the weakest spot in the agency set up to improve the standard of our oldest and most important industry' ;—that 'between the expert on the one hand and the cultivator on the other, there is practically no link.' Indeed, in his opinion, 'it would be scarcely an exaggeration to say that the experimental farm and the scientific expert mean no more to the great mass of the land-owning and cultivating classes of this Presidency than the laboratory and the alchemist did to the Middle Ages.' Mr. Reed's remedy is the formation of agricultural associations and the organisation of agricultural shows. As, however,

'it is desirable to hasten slowly,' Mr. Reed would, to commence with, simultaneously organise at Surat and Poona, 'associations whose principal business it shall be to focus diffused effort into annual exhibitions, made as attractive as possible, where the progress of agriculture can be brought home to the landowner and the ryot with a force and directness which all other means cannot equal.' Mr. Reed has no objection, in the early stages of the movement, to ask for Government assistance, 'but if the movement is to have life and durability, the burden and heat of the day must be borne by non-officials.'

Mr. Alfred Chatterton, who stands in no need of introduction to persons taking interest in matters industrial, explains with characteristic ability and at considerable length (pp. 122-49), the important subject of 'Lift Irrigation.' His object in presenting the paper 'is to draw attention to the advance which has recently been made in the Madras Presidency in the scientific study of subterranean water and well irrigation, and to place at the disposal of those interested in the improvement of the agriculture of India, the information which has been gathered in the Irrigation Department during the four years it has been at work.' How well this is done one has only to read the whole of Mr. Chatterton's paper to realise. To be convinced of the desirability of substituting mechanical appliances for the means of raising water adopted at present, the reader may peruse the following :—

'One of the causes of the poverty of the people of India is the little use they make of mechanical appliances, and efforts should be made to affect a change in this direction. The great rise in the price of food-stuffs, accompanied as it is by an equivalent or even greater rise in the wages of the labouring classes, has brought many of the wealthier agriculturists to a similar conclusion, and it is certain that in the next few years a great advance will be made by the substitution of oil and gas engines for bullock power in many of the processes for preparing agricultural produce for the market. It is necessary that this opinion should gain ground, and be more widely accepted,' etc. (P. 125.)

'Well cultivation is carried on to the utmost extent possible under the existing conditions, and if any great extension is to take place in the immediate future, it must be by supplying the ryots with additional power for lifting water. At the same time the cost of that power must be very much less than that they now pay for any work done in the way of lifting

water which is beyond the capacity of the cattle they keep for general agricultural purposes.' (P. 127.)

'I do not think it is any exaggeration to say that the oil-engine and pump will prove, and in fact are proving extremely potent agents in the development of the material resources of the country. Already in some of the rural tracts the ryots are familiar with them, recognise their merits, and regard them as desirable things to possess; whilst those who have got them have been led to take a much deeper interest in agriculture than they did before, and being intelligent men with capital, their farms are becoming the centres for the diffusion of improved agricultural practices throughout the country.' (P. 133.)

It is encouraging to be told that there are now about 100 pumping plants at work in the Madras Presidency, that there is ample evidence that the new system of lift irrigation is very profitable, and that there is the best indication that it is appreciated in the fact that the rate of increase in the number of installations is greatest in those places where the number is already largest or where they have been longest at work. 'In ordinary years and under normal conditions, given a sufficient water-supply there should be no difficulty in turning it to very profitable account, but often with oil-engines and pumps the greatest profit will be made in years when the season is unfavourable, scarcity prevalent and prices high.' In many cases oil-engines and pumps may be used to supplement other sources of supply and convert agriculture of an uncertain type into one of great certainty. According to Mr. Chatterton it may possibly be desirable in the future to amend the Agricultural Land Improvement Loans Act so as to provide greater facilities for obtaining loans for the purchase of engines and pumps. The Government itself may purchase the engines and pumps and sell them to the ryots on easier terms than the ryots can do. Another suggestion is—

'Where the water-supply is very abundant and where the ryots have no capital and the land is sub-divided into small plots, it might be practicable to establish local water-supply companies who would raise water and sell it to the ryots either for a share in the produce of the land, or for a fixed rate per unit of volume or a fixed charge per acre irrigated. If anything of this kind is to be brought about, it will probably be necessary for Government to pioneer the way, and to provide sufficient legal protection to induce capital to flow in this direction. (P. 146.)

In many places 'it will probably be found most economical to have a single power-generating station and to distribute the power electrically, driving centrifugal pumps with electro-

motors.' Altogether a very informing and suggestive paper this of Mr. Chatterton's.

There are next three papers on the cultivation of cotton followed by four on the hand-loom weaving industry. Mr. Gammie treats the subject generally (pp. 150-5) and his conclusion is that at the present juncture we are only in a position to say tentatively, that exotic cottons can only be cultivated in favoured parts of India; tree cotton cultivation is not worth the risk; varieties can only be improved in their own localities by the adoption of methods of selection and crossing, and that varieties can only be maintained in a pure state in the fields if the cultivators and traders are willing to observe the needful precautions.

Mr. Clouston of the C.P. Agricultural Department writes on cotton cultivation in the Central Provinces. (Pp. 155-64.) The area under the crop in these Provinces has increased from 1,837,767 acres in 1866 to 5,821,041 acres in 1907. It now occupies a larger area than any other crop, rice being second in importance with an area of about $4\frac{1}{2}$ million acres. Mr. Clouston details the steps that are being taken for the improvement of cotton in the Central Provinces and Berar, and says in conclusion:

'As yet the work has but begun but steady progress on these lines should have far-reaching effects. It will enable the cultivator to procure supplies of pure and improved seed of the indigenous varieties and of such acclimatised long-stapled varieties as are likely to succeed in his tract. It will enable the local manufacturer to procure better lint of the present short-stapled Jadi and of a purer form of Bani; it will, we hope, also enable him to obtain locally a larger supply than he does at present of the long-stapled varieties instead of having to import them from America, as he is compelled to do under existing conditions. The work of improving this, our most important crops, is thus being conducted on sound *Swadeshi* lines.' (P. 164.)

Mr. W. V. Chandekar writes at great length on the 'Cultivation of Cotton in Berar' (pp. 164-87). Mr. Chandekar regrets that along with the efforts towards an increase in the area under the crop there have been absolutely no endeavours to improve its quality. 'This has resulted in the deterioration of the commodity produced and the fair name of the province has suffered.' Improvements are required in two directions—increase of outturn and improvement in quality. The old Bani and Jadi varieties should be revived. The

opening of seed depôts will be productive of much practical good. Several other measures the adoption of which will result in good are suggested by Mr. Chandekar.

Mr. Bezoni Dadiabhoy, if any one, is entitled to be heard with respect on 'The Weaving Industry' (pp. 187-90). Mr. Bezoni is confident that the hand-loom weaving industry is capable of great expansion. 'What is wanted is education and organisation.' Weaving schools, specially for the children of weavers, should be established where not only the art of weaving but reading and writing will be taught. The grown-up weavers too may learn something from exhibitions which might be held in these schools from time to time, and they may be offered prizes for new designs or excellent work.

'Cooperative Weavers' Societies might be formed, which might buy raw materials and sell finished articles on behalf of members or others who may wish to benefit by its rules. The society may obtain information as to where the best raw materials at reasonable rates could be had, what the materials are, what finished articles are most in demand, and where, and supply such information to the members. Of course, it may also advance the necessary funds. Each individual weaver must be left free to make what he pleases, and as much or as little as he pleases.' (Pp. 187-8.)

Mr. Bezoni considers that hand-weaving at home is capable of competing favourably with power-weaving in a factory. His opinion of the fly-shuttle is that while it has been rightly given the chief importance and is good where certain class of weaving has to be done, the old hand-loom is found to be the best where coloured weft with separate shuttles for borders is necessary. 'Then there are several descriptions of cloth of various designs which can only be made best on hand-looms and where production is of less importance and in this case, too, the ordinary loom is found to be the most suitable.' 'The simplest and lightest appliances should be the aim of every inventor' of improved looms. Besides, 'what is now wanted is an improvement in the method of winding, warping and sizing.' Mr. Bezoni's conclusion is hope-inspiring: 'Hand-weaving may be advantageously carried on on an extensive and paying scale and thus find employment for numberless people.'

Mr. Alfred Chatterton writes at length on 'The

Salem Weaving Factory' (pp. 190-208), Mr. D. C. Churchill on 'The Hand-loom in Ahmednagar' (pp. 208-17), and Mr. Chunilal B. Desai narrates his experiences of the hand-loom factory at Nadiad (paper on 'Hand-loom Weaving in India,' pp. 217-27). The Salem Weaving Factory started by the Government of Madras on the suggestion of Mr. Chatterton himself

'is an experiment to ascertain whether it is possible to improve the condition of the hand-weavers in Southern India—(1) by substituting for the native hand-loom improved hand-looms which will enable the weaver to produce a greater length of cloth in a given time without in any way sacrificing the essential characteristics of native hand-woven goods; (2) by introducing the factory system among the weavers, so that they may work under the management of men with commercial and manufacturing experience, and so that capital and organisation may be introduced into the industry to render the hand labour more productive; (3) by introducing, if possible, improved preparatory processes to diminish the cost of the preliminary warping and sizing which the yarn undergoes before it is placed in the loom (pp. 192-193).

'The future action of Government in regard to the weaving industry will largely depend upon the kind of solution which is arrived at' at the Salem factory. Mr. Chatterton thinks—rightly enough as many a worker in the field can tell—that 'if the hand-weaving industry is to be materially improved, a great deal has to be done not merely in connection with the technical details of the weaving processes, but also in connection with the training and education of the weaver himself.' A question of the greatest interest at present is whether the hand-weaver will survive the stress of competition or be driven as in other countries to seek a livelihood at other work. In Mr. Chatterton's opinion—

'The answer is doubtful. The fact that he has survived so long is in his favour and there is no doubt the transitional period can be prolonged, but it is still an open question as to whether he can be in a position which will enable him to command the same wages for the same number of hours of work as the power-loom weaver, or the blacksmith and carpenter, whose industrial existence is not threatened by the prospect that ingenious machinery will be devised to supplant them.' (p. 194.)

As Mr. Bezonji has said,—and as we have remarked it is the experience of others as well,—one great difficulty is to get the weavers to adopt new looms and new methods. Mr.

Chatterton thinks likewise. He says : ' One result of our work at Salem during the last 18 months is to furnish fairly reliable data for the opinion that the weaver himself is not likely within any reasonable time to change his methods of working and take to the fly-shuttle loom and it seems almost certain that in this part of India the factory system will have to be introduced if anything is to be done.' Mr. Bezonji, however, would not do so if he could help it. One solution of the difficulty appears to Mr. Chatterton to lie in the agency of Weavers' Guilds or other forms of cooperative enterprise. Of one thing he is sure : ' The only hope of progress in this part of the country (the Madras Presidency) is that outsiders will put their money into the trade and that through their intelligence and energy it will be placed upon a new footing.'

Mr. Churchill's fine paper is interesting as coming from one by whose name is known a new kind of factory hand-loom that has been found to be more satisfactory than almost any other of its kind. The development of the hand-loom at Ahmenagar is due to his efforts. Any improved hand-loom according to him must be capable of being run all day after day, *with ease*, by an ordinary man ; it should have a speed approximating to that of the power-loom ; it must be adaptable to all ordinary widths and fineness of Indian hand-made cloth.

Mr. Desai pleads for the re-introduction of the *Charkha* (hand-spinning wheel) in Indian homes.

We pass on to Mr. H. H. MacLeod's short, interesting paper on ' The Coal-Mining Industry of India ' (pp. 227-31). Mr. MacLeod rapidly traces the growth of this ' finest of all Swadeshi industries,' which ' has a magnificent future before it.' ' The dormant energy of " Coal " awaits the commands of India's millions and signs are not wanting that a great industrial awakening is in store for India. If the active energy of this useful commodity is fully reflected in the energy of her people, India will take her proper place among the nations of the earth.' Mr. MacLeod expresses the opinion that electricity, being a very flexible power, ' is destined to play a great part in the future of Indian mining, and it is with the aid of electricity that the labour problem is about to be seriously attacked.'

Mr. R. C. Whitenack, the able American gentleman who acts as Economic Adviser to the Government of H. H. the Maharajah Gaekwar of Baroda, contributes an important paper on that industry of immense potentiality, the cotton-seed oil industry (pp. 232—47). The value of the crude products alone is over two crores a year, and when the value of the finished products is considered, it is an industry with a potential yearly value of 16 crores. As yet this is untouched, and so much wealth is being sacrificed. Mr. Whitenack considers separately the technical and commercial sides of the subject. The former need not detain us here. The important question is if there is a market for the products. For the oil itself there is a vast dormant demand in India and a rapidly expanding demand in Europe. But how about the cake? Notwithstanding difficulties, Mr. Whitenack is convinced 'that there is a sufficient demand even now to support the industry on a small scale, and its development will depend to a large extent upon the development of scientific dairying and stock breeding and upon the energy of local oil-presses in cultivating foreign markets for the cake. Active canvassing and judicious advertisement will do much to develop the market at home, as a competitor of linseed, safflower, sesamum and other native seed-cakes.' It is probable, however, that Indian crushers will have to depend principally upon foreign markets for the disposal of the cake. An examination of some statistics shows 'that while the home market for cake and meal may be slow in developing,' there is no dearth of foreign demand. It remains only for the Indian manufacture to meet the competition in so far as possible with regard to quality.'

Mr. P. Roy Chaudhuri of Calcutta, an enthusiast in matters industrial, considers the subject of 'Oils and Oil-seeds' (pp. 247—68). He brings together a mass of useful statistics which are instructive as showing what a 'gigantic' industry may be built up out of the oil-seeds that are now exported (in 1906-7) to the extent of 19,539,873 cwts, in weight and Rs. 12,82,97,037 in value. At the same time so much as 1,468,724 gallons of oil, of the value of Rs. 26,33,721, is imported whereas probably not a gallon need be, and a considerable quantity can be exported, if the seeds of different

varieties are crushed in the country itself. There are, at present, over a hundred and fifty oil mills, large and small, in India, but there is room, as there is need, for many more.

‘ The export of oil-seeds, instead of only the oil expressed therefrom, impoverishes the country in three ways, namely,—first, by denying our labourers the employment that legitimately ought to belong to them, secondly, by constantly denuding the soil of its own product of valuable manurial constituents, and lastly, by depriving the cattle of a very rich and concentrated auxiliary food. We have to admit with regret, on the other hand, that the labourer is starving himself to death from want of work and wages, that manure represents one of the ryot's main wants (the other being water) and that the solution of the problem of preservation of cattle from constant famine or scarcity is daily becoming more difficult.’ (P. 251.)

Mr. C. Gopal Menon of Madras has a paper on the Sugar Industry (pp. 366—72). No one who remembers that this home of sugar-cane and the sugar industry, imports nearly nine crores worth of foreign sugar in a year, need be told of the vast importance of the subject. While not denying the necessity of modernising methods and economising production, the Honourable Pandit Madan Mohan Malaviya, who moved a resolution on the subject at the Conference, spoke impressively (pp. 392—4) on the imperative need of keeping out foreign sugar by the expedient of heavy import duties. Mr. Gopal Menon attaches greater importance to methods and processes beginning with the cultivation of cane and ending with efficient methods of refining. And he urges the establishment of many small factories with a capital of 50 to 60 thousand rupees a-piece.

Mr. Kundunmal Manghirsingh of Hyderabad (Sind) describes ‘ the Arts and Industries of Sind ’ (pp. 355—65). He has to tell the same tale as those of other provinces.

‘ The province of Sind from which I come, is at the present moment very backward industrially. At one time we were far ahead of some other provinces and our province was famous for her indigenous products. But alas ! owing to keen competition our industries are deteriorating. It is not only that our local manufactures are not exported outside the province but they are not patronised to any appreciable extent by the Sindhis themselves and the result is that some of them are dead and others are dying. Unless the new *Swadeshi* spirit spreads in Sind as it has done in several other parts of India, the fate of Sind industries is sealed. (P. 355.)

Mr. Kundunmal proceeds to explain the state of the important arts and industries of Sind, which are (1) glazed pottery known as Hala pottery; (2) lacquered work; (3) cloth printings; (4) silk and gold thread embroidery; (5) cloth manufactures—hand-loom; (6) carpet industry; (7) the sugar industry; (8) mats and reed work, and (9) the leather industry.

Similarly, Mr. V. Nagamiah, late Senior Dewan Peishcar of Travancore and author of the *Travancore State Manual*, who has an unsurpassed knowledge of that interesting South Indian State, gives us a deal of useful material on 'The Arts and Industries of Travancore' (pp. 269—89). It has been said of Travancore art-work, that its 'ivory carving is beyond doubt the best in all India.' Its 'jewellery is approached by none that I (Colonel H. P. Hawkes, President of the Madras Committee of the London Exhibition of 1886) have seen,' its 'steel work inlaid with gold is peculiarly interesting' and (judging from a photograph) its 'wood work must be very fine.' Among the several industries waiting for development is the extraction of plantain fibre.

'Plantain trees of different varieties are grown abundantly all over the State, and in fact almost every Malayali house has its own plantain trees behind it in the garden. The extraction of the fibre is only a simple process and as it does not affect the edible and valuable portion of the plantain tree there is a vast field open for a new and paying industry, our capitalists will do well to put in hand before foreign capital which steps in.' (Pp. 279-80.)

It is satisfactory to know that a 'Travancore Banking and Industrial Union' is being promoted by Mr. Nagamiah himself to take in hand not only this but other lucrative industries as well.

Rao Bahadur Madhavaram Harnarayan Vyas's paper on the 'Stone Industry in Cambay' (pp. 289—99) is deeply interesting. Cambay was an important trade centre in times gone by but its decline began with the rise of Surat as the latter itself has gone down as Bombay rose. In the present paper Mr. Madhavaram tells us what the Cambay Stones are, whence they come, through what processes they pass, into what articles they are manufactured, and where they go. 'The term Cambay Stone includes different varieties of stone manufactured into different articles of use and ornament, in Cambay, and not stones found in the Cambay soil, as the

term seems to suggest.' The articles prepared from the stones are of great variety.

' They are studs ; sleeve-links, flat, oblong, circular, semi-circular and oval ; various kinds of pieces for head-ornaments, ear-pendants, watch chains, and charms ; amulets of various designs ; bracelets, armlets, wristlets, seals, watch seals, necklaces, slabs large and small, for boxes ; rosaries of circular-cut or diamond-cut beads ; paper-weights, paper-cutters, steel-holders, ink-pots, knife-handles, cigarette-pipes, rulers, seals, flower-vases, cups and saucers, chess-men ; *Shiva-lingas*, with or without base ; and many others like cannon with carriage and trap-pings.' (P. 297.)

The industry is most lucrative as ' it is calculated that raw stones of the value of Rs. 1,000 are capable of being manufactured into different articles of the total value of Rs. 1,00,000, *i.e.*, raw stone after being worked acquires one hundred times its original value, and this with the crude methods and primitive instruments now in use. The total value of raw stones, annually imported, is estimated at about three to five thousands and the total value of articles annually sold at about a lakh and a half to two lakhs.' Unfortunately, ' the spirit of cooperation is lacking, and the general ignorance prevailing among them (those engaged in the work) tells against the development of this industry, though it is full of promise.'

There remains to notice Mr. G. B. Phansalkar's paper on the ' Purchase of Government Stores ' (pp. 293—317). Mr. Phansalkar carries out his inquiry not only ' with a view to ascertain whether the Government is a friend or foe of the *Swadeshi* cause but also with a view to bring to the notice of the public at large the all-pervading customer in Government who, if inclined to buy *Swadeshi* goods, can buy much more than all of us put together or foster by direct encouragement the Indian arts and industries more than we all can do.' In this connection it cannot but be regretted that the labours of the Indian Stores Committee of 1906 have apparently proved infructuous, the Report of the Committee not even being published.

A word suffices to call attention to the subjects of great present importance to which the resolutions of the Conference (pp. 1—4) relate and to the several interesting speeches delivered thereon by men distinguished each in his way

(pp. 373—98). During the months that have followed the Conference action has been taken in respect of some of them, though but to a small extent ; but that story must be reserved for another place and occasion. It need only be said in conclusion that the Third Indian Industrial Conference transacted business of great public usefulness.

**Resolutions passed at the Third Indian Industrial
Conference, held at Surat on the
30th December 1907.**

I. Industrial Survey.

Resolved—That this Conference expresses its sense of satisfaction that an Industrial Survey has been carried out in the United Provinces, and is being carried out in the Central Provinces and Berar and in the Baroda State, and it would urge other Provincial Governments in British India and the Governments of other Indian States to carry out at an early date Industrial Surveys of the territories within their jurisdiction, as exact and detailed information would afford facilities for the introduction of a sound system of technical education and the well-ordered development of indigenous industries.

[Proposed by Sir Bhalchandra Krishna, *Kt.* (Bombay), seconded by K. Natarajan, Esq. (Bombay), and carried unanimously.]

II. Technical and Commercial Education.

Resolved—(a) That this Conference reaffirms the Resolution on Technical and Commercial Education passed at the last Conference.

(b) That this Conference thanks the Government of the United Provinces for the action taken by them with a view to introduce a fairly comprehensive system of Technical Education in those provinces, and would express the hope that other Provincial Governments will be pleased to convene representative conferences such as the recent Naini Tal Conference, to devise measures for the spread of Technical Education in their respective provinces. And this Conference further expresses the hope that the Government of India would provide adequate funds for giving effect to

the recommendations of the Naini Tal Conference and carrying out similar schemes in other provinces.

(c) That this Conference, while appreciating the action taken by the Governments of some Indian states to encourage Technical Education, urges that further steps should be taken in the same direction in all Indian states.

(d) That this Conference welcomes the growth of public interest in Technical Education, as shown by the action taken by certain local and municipal boards and private associations in promoting it, and it strongly urges on the leaders of the people the necessity of taking practical steps for providing increased facilities for it by starting institutions and founding scholarships to encourage technical studies in India and abroad.

[Proposed by R. C. Whitenack, Esq. (Baroda), seconded by D. G. Dalvi, Esq. (Bombay), supported by Ishwar Das Varshini, Esq. (Aligarh), and Professor Ruchi Ram Sahni (Lahore), and carried unanimously.]

III. Agricultural Education.

Resolved—That this Conference records its sense of appreciation of the action taken and contemplated by the Government in regard to the establishment of Agricultural Colleges in the several provinces, and would urge that in view of the importance of a wider spread among the cultivating and landholding classes of a practical knowledge of the principles of scientific agriculture and modern methods, Government would be pleased to establish Experimental and Demonstration Farms as widely as possible and to start vernacular schools in connection with them, one at least in every district.

[Proposed by G. Subramania Iyer, Esq. (Madras), seconded by Rao Bahadur Khandubhai Gulabbhai Desai (Surat), and carried unanimously.]

IV. Agricultural Banks.

Resolved—That this Conference begs to call the attention of Government to the urgent need of promoting the establishment of Agricultural Banks to help co-operative credit

societies and to advance loans directly to agriculturists at reasonable rates of interest, and further begs to suggest that the advice and co-operation of representative members of the Indian community may be enlisted in devising a suitable scheme to secure this object.

[Proposed by Rao Bahadur Lalshankar Umiashankar (Ahmedabad), seconded by Thakorram Kapilram, Esq. (Surat), and carried unanimously.]

V. The Mining Industry.

Resolved—(a) That this Conference expresses its sense of satisfaction at the successful formation of the Tata Iron and Steel Company, Limited, with the help entirely of capital raised in India.

(b) That this Conference invites the attention of capitalists in India to the urgent need of developing and fully utilising the mineral resources of the country, and trusts that, in view of the ultimately lucrative character of the industry, they will make organised efforts in that direction.

(c) That this Conference is of opinion that special consideration should be shown to Indian enterprise and initiation by the Government and preferential treatment given to it.

[Proposed by Rao Bahadur R. N. Mudholkar (Amraoti), seconded by the Honourable Mr. Gokuldas K. Parekh (Bombay), and carried unanimously.]

VI. Cotton Spinning and Weaving.

Resolved—(a) That this Conference records its sense of satisfaction at the stimulus the Spinning and the Weaving industry have received from the Swadeshi movement, and it urges the bestowal of increased attention on Cotton Cultivation, the erection of Spinning and Weaving Mills at suitable centres, and the revival of the Handloom Weaving industry on a commercial basis as essential to the success of the movement.

(b) That this Conference urges the Government to remove the restrictions retarding the expansion of the industry and to provide facilities for affording practical instruction

in weaving by the establishment of Weaving Schools at every important weaving centre.

[Proposed by L. K. Tulasiram, Esq. (Madura), seconded by S. B. Sankaram, Esq. (Ellore), and carried unanimously.]

VII. The Sugar Industry.

Resolved—(a) That this Conference notices with concern the increase in the imports of foreign sugar, and is of opinion that, to arrest the steady decline of the indigenous industry it is absolutely necessary to encourage the cultivation of healthier and more prolific varieties of cane, to employ greater care in cultivation, to use more economical processes for extracting the juice, and, above all, to adopt the most modern and efficient methods of refining.

(b) That this Conference urges the Government to provide more extensive irrigational facilities, allow the utilisation of bye-products, and, further, to consider the desirability of imposing a duty upon imported sugar in order to protect the indigenous industry.

[Proposed by the Honourable Pandit Madan Mohan Malaviya (Allahabad), seconded by Manubhai Nandshankar, Esq. (Baroda), supported by Lala Dharam Das Suri, (Lahore), and Chunilal Vrijbhukandas, Esq. (Bombay), and carried unanimously.]

VIII. Appointment of Office-bearers and Provision of Funds for the year 1908.

*Resolved—*That this Conference re-appoints Rao Bahadur R. N. Mudholkar as General Secretary and Mr. C. Y. Chintamani as Assistant Secretary, and it appeals to the public for a sum of Rs. 10,000 for meeting the expenses for the next twelve months.

[Proposed by Sir Bhalchandra Krishna, Kt. (Bombay), seconded by the Honourable Pandit Madan Mohan Malaviya (Allahabad), and carried unanimously.]

AMBALAL SAKERLAL DESAI,

President,

Third Indian Industrial Conference.

R. N. MUDHOLKAR,

General Secretary,

Indian Industrial Conference,

Surat,

30th December 1908.

REPORT

OF THE

Third Indian Industrial Conference.

The Third Indian Industrial Conference was held in the Congress *Mandap* at Surat at 12 noon on Monday, the 30th December 1907. There was a large gathering of delegates and visitors belonging to the different parts of India. The Conference was opened by Professor T. K. Gajjar, Chairman of the Committee, who delivered the following speech :—

Speech of the Chairman of the Committee.

BROTHER-DELEGATES, LADIES AND GENTLEMEN,

Before I proceed to discharge the duties assigned to me by the Reception Committee of the Third Industrial Conference, I must offer my apology for my inability to do justice to the responsible work entrusted to me. I have often been invited by kind-hearted friends to speak on the topics connected with my favourite lines of work. I have, however, been obliged to decline the invitations, as I have always felt myself diffident about venturing on public platforms. I have no hereditary aptitude for the art of public speaking, being born of an artisan family, and have therefore contented myself with doing whatever other work lay within my power. But the citizens of Surat, the place of my birth, nominated me to the proud privilege, for which I am thankful to them, of according to you all—the representatives of Industrial India, a hearty welcome worthy of the city which was the greatest industrial and commercial centre on this side of India under the Moguls, and I could not decline the nomination. It was here at Surat that our present rulers got a footing as traders after roaming over seas, and it was here that they established the factory which developed in the course of centuries into a

great Empire. Surat then was in the zenith of her glory. Skill, intelligence, enterprise and commerce combined to shed lustre over it. But, alas ! now its glory has gone, and its energy and activity have declined. The world-renowned arts of Surat now lack the spirit of progress and linger behind the advances of *Science*. At this place then, Gentlemen, I give you a most cordial welcome.

It is in the fitness of things that this Conference should meet at a place which furnishes an object-lesson of our present economic situation, and which should consequently inspire and stimulate the sacred work we have undertaken. It was a happy idea of the Benares Exhibition Committee to organise in connection with the Industrial Exhibition, an Industrial Conference. In doing so they took the practical step without which, according to the penetrative observation of the Hon. Dr. Rash Behari Ghosh, exhibitions were useless. The practical genius of the great Ranade also had perceived the necessity of Industrial Conferences, which were consequently held in Poona in the years 1891-92-93. But this movement did not continue after the elevation of Mr. Ranade to the Bench of the Bombay High Court. Its spirit lay dormant. It was reserved for a Gujarati colonist of Upper India, the Hon. Munshi Madho Lal, with the able co-operation of Mr. R. N. Mudholkar, to revive the] movement and secure the co-operation and sympathy of all workers, whether official or non-official, the cause of India's industrial progress. The Conference was launched at a very opportune moment—a moment when India experienced travails caused by the birth of far-reaching movements—a moment when the Swadeshi movement swept over the whole country, welcomed and supported by all people, rich or poor, literate or illiterate.

The national spirit embodied in the sessions of the Indian National Congress gave a tangible shape in 1901 to our industrial endeavours by the institution of an Industrial Exhibition at Calcutta under the organising talent of the Hon. Mr. J. Chaudhuri. The sessions that followed organised these shows on a more or less grand and comprehensive scale. But it must be said they were not pervaded with the spirit and

insight which advanced industrial nations have manifested in the exhibitions held by them. Instead of making arrangements to show the processes of manufacture our raw products pass through in foreign countries, or suggesting lines of development for our existing industries, we collected samples of articles manufactured in India to give an opportunity to the agents of foreign manufacturers to take minute notes of them and prepare their cheap machine-made imitations to replace our manufactures in our own market. These remarks will, I hope, be borne in mind when such exhibitions are organised in future.

The short time at our disposal has not enabled us to exhibit Indian-made articles on these grounds. We have tried to meet this deficiency by holding a small but excellent exhibition of handlooms, including some from Surat itself. This is the first time, therefore, that our Conference meets without its parent institution. This break, let us, however, hope, will conduce to a modification of the ideals of future exhibitions.

Brother-delegates, we have assembled here to deliberate with a view to take practical steps in regard to the vital question of the industrial regeneration of ourselves, on which all other questions—political, social, religious—depend to a greater or less extent. This platform of science and industry makes room for all classes of the people to meet together, laying aside personal ambition, political animosity, religious prejudices and state officialism, so that they could all combine in an unanimous effort to raise every class in society to a higher condition of personal excellence and usefulness, and extinguish class distinctions by diffusing equal education. We have taken in hand this most vital question, and we cannot allow any further time to pass by, without organised action to raise our nation to the rank from which it has fallen.

I may now crave your indulgence for a brief reference to the great problems on which the industrial efficiency of a nation depends. Keeping aside the political, geographical and sociological factors, we may touch the economic factors which have been repeatedly pointed out in lucid and definite language as being available in our country. Our fertile lands,

rich mines, vast forests and hidden treasures, the natural forces pent up in the mighty water-falls of the rivers that irrigate India,—the capital hoarded in temples and invested in non-industrial transactions,—the abundant labour that can be obtained on easy terms,—have not arrested the decay and poverty with which we are overwhelmed. Our ignorance and apathy, and the influence exerted by foreign manufacturers on our fiscal policy have reduced us to such a state.

For the last so many years we have been working for the progress of our nation, but, I must say, without a proper grasp of the methods and aims of that progress. We have neglected the lines of the solution of economic problems followed by the foremost nations of to-day. Some of our national problems would ere now have been solved to a great extent, if systematic technical education along with general education had been introduced throughout India. Japan adopted technical education 25 years after our benign Government initiated the present educational system in India, and during such a short period she has become a comparatively trained nation, trained to think, trained to do the best along any line that may turn up, and has grown into a world-power whose friendship and good will are sought by other nations. But what has been our fate? Our indigenous industries have been crippled by foreign competition, or have languished for want of a proper application of the modern industrial methods. The nation that proudly called herself the workshop of the world, allowed our country to be degraded into one of the chief markets of the world. Foreign syndicates make use of India's natural forces to deprive her of mineral wealth, in the absence, among other causes, of enterprise and adequate training on the part of the people.

For example, the Mysore Government is generating electric power in the Cauvery at a tremendous outlay of its people's money, and has leased it to a foreign syndicate to exploit the mineral wealth of the State in return for a small royalty. The resources of the State are doubtless developed thereby, but its people have not been profited to the extent they ought to have been, and have not acquired any aptitude for scientific mining or for making use of the natural forces.

What is thus happening in Mysore also operates more or less all over the country. The Indian Government is trying to develop the mineral resources of India, but it must be borne in mind that the development of a country is quite different from that of its people. The exploitation of America, Africa and Australia has resulted in the extinction or serfdom of the original inhabitants.* The present Amir of Afghanistan fully realises this difference, and does not grant concessions to foreign capitalists to work the rich mineral deposits in his country, but engages foreign experts to train his subjects to develop the resources of the country themselves. This shows that the Amir cares more for the permanent interests of his subjects, than for the temporary gain to his treasury from concessions to foreign syndicates on easy terms.

The charge of this neglect of duty, however, does not wholly attach to our Government: we must share it in part ourselves, because the pioneers of modern industries in India have not combined their energies together to devise ways and means for organising a system of technical education managed by and for them.

We shut our eyes to the benefits other nations have reaped through an efficient educational system in their countries. Our very bones and marrow (oilseeds) are exported to fertilise other lands, and our corn is exported to feed others when our people barely get one meal per day. Our raw products are sent to foreign countries and imported as manufactured goods. Thus the large margin of profit that should have served to feed our own brethren goes to enrich the foreign manufacturer.

All this happens under our own eyes. Not being provided with the modern industrial facilities and mental equipment, we have been reduced to a state of helplessness, and we suffer ourselves to be impoverished and our country to be exploited by foreigners.

I cannot omit to mention in this connection the work the

* "If," says Mr. Clark, "the Government would grant railway and mining concessions to foreigners, the country would develop rapidly, for its mines alone would attract many prospectors and, if found to be as extensive as currently believed, much capital would follow. The Government and people, however, are united in opposing any concessions to foreigners."—*The Indian Trade Journal*, Dec. 12, 1907,

Government and some of our enlightened people have done in this direction. Our rulers have in their own way and in accordance with their light and interest fostered education, general and technical, have carried on economic and industrial investigations, have organised departments deemed necessary for the industrial expansion of modern times,—undertaken experiments and convened conferences for the development of the resources of India. } But the people of this country have themselves availed but little of these surveys, of the reports and monographs published by the Government or of the results of its experiments and investigations, because they were never taught the modern methods of handling industrial questions. }

In the same way the large sums subscribed by our people were utilised by the Government for educational purposes in accordance with the prevalent ideas about education. Had a portion of these sums been spent in educating our artisans, farmers and capitalists in the ways and means pursued by the people of Europe and America, we would not have been made dependent on others for the necessities of our life. Our Princes introduced facilities for technical studies in their states but their measures were not carried out in the right patriotic spirit which demands in educationists earnestness, completeness and foresight, especially in a country like India, rich in resources and abounding in people addicted to conservative and exploded methods of work and unaware of the progressive and scientific methods of advanced nations.

Lord Reay's famous Resolution on technical education fell into disuse, because persons entrusted to carry it out did not possess the essential qualification just mentioned. The resolution aimed at making the Sir J. J. Art School a central institute for art industries, the V. J. T. Institute one for mechanical industries and the Poona College of Science one for scientific and technological studies. But when Mr. Chatfield was interpellated in the Bombay Legislative Council as to the fate of the Resolution, his reply was to the effect that the problem of industrial training was being solved by the Technical School of Baroda.

The Kalabhuvan of Baroda was instituted when H. H. the Gaekwar initiated his enlightened policy for the advancement of his subjects. General education, the foundation of

all technical education, was made free and compulsory in one division of the State, *i.e.*, in Amreli, and by this time it is extended to all the divisions. Three trade schools were also opened. A State museum was established, and a system of industrial loans was instituted on the lines of the culture system of Java suggested by Mr. Ranade. This liberal policy encouraged me to organise the Kalabhuvan which had for its ideals the Zurich and Charlottenburg technical schools. It undertook to impart instruction in such subjects as would not only serve the present industrial needs of the people but enable them to start new industries.

The industry that occupies a prominent place in our commercial life is the mill industry. Its commercial and mechanical sides are attended to but until recently no thought was devoted to the development of its chemical and artistic aspects. Our technical schools are partly responsible for the neglect of these important factors in mill industry. With the single exception of the Kalabhuvan, they rested satisfied with the provision of instruction which the existing needs of the industry required, and took no steps to introduce studies necessary for its further development. The V. J. Technical Institute is now arranging for instruction in Dyeing and Textile Chemistry twenty years after the Kalabhuvan took up the subjects at Baroda.

The Kalabhuvan had a great share in the introduction of the dyeing industry in India. When our vegetable colours were driven out from the world's market, which they had held for centuries, by the marvellous colours modern chemistry had extracted from coal-tar; when our dyers and weavers were reduced to poverty, their occupation having been taken up by others, there was no recourse left but to make use of these new colours and not to pay unnecessarily for the process of dyeing carried on outside India. Germany, the home of these chemical dyes, was anxious to secure a market for them in India. Our mill industry also needed a healthy growth and development. These considerations led me to suggest to the great colour manufacturers of Germany to train students and instruct native dyers in the use of their dyes if they desired India to become one of their great consumers. They appreciated the suggestion and

acted upon it, and started their first laboratory in this very city, and commenced to instruct students and native dyers in the processes connected with dyeing. When the late Mr. J. N. Tata heard about this, he at once communicated with me and made up his mind to append a dye-house to his mill, with the help of dyers trained in my private laboratory at Baroda. Dyeing schools were soon after opened at Almedabad, Delhi, Cawnpore, Amritsar and other places under my supervision, and several trained dyers were sent round as travelling agents. These are the educational methods the Germans adopted for their purely commercial interests, and the result is the present remarkable revival in our dyeing industry. My friend Mr. Tulsiram, who introduced dyeing at Madura, informed me at the time of the last Bombay Congress that 47,000 Sourashtra settlers have been blessing the trained dyer, sent by me there some years back, and that the Glasgow turkey red yarn manufacturers had to send their agents to Madura to enquire why all the imports were stopped and what were the methods of dyeing there adopted. Since that time an extensive use of coal-tar colours is made in India and dye-houses are opened in our mills in numbers, and thus is saved to her the margin of profit swallowed by Lancashire and Glasgow.

We live in a time when new ideas are spreading. For instance, many believe and their number is on the increase, that since our Government cannot be expected to promote our industries by a policy of Protection, we should promote them ourselves by means of a consumers' league to boycott foreign articles. Now I do not wish to assert either that boycott is altogether impracticable or it is altogether useless. What I do wish to point out is that boycott can never by itself solve an industrial problem. For instance, the word agriculturists of India boycotted indigo, branding it "devil's drug" and the Legislature also came to their aid by passing the harshest law to punish those who imported it. But the use and import of indigo went on in England until modern chemistry produced the colouring matter artificially and at less cost. Scientific knowledge, technical skill, and industrial enterprise and organisation—these are the true remedies, the only positive forces we can rely on to develop our industries.

It has been pointed out above that the expansion of mill industry has not been attended with the parallel development of the chemical industries. Many raw products await chemists to transform them into articles of use and commerce. Take for instance, the varieties of seeds our land produces from year to year. They are sent to foreign countries to provide us with their oils and derived products. If we started oil mills, a group of chemical industries will come into existence and utilise the bye-products. You are not unaware of the new and unexpected avenues of industries which the chemistry of bye-products opens up in the West. For the last twenty years I have been preaching the great future that lies in store for oil industry in our country. The dazzling prospects that the textile industry holds forth, however, leaves little room for it to attract capitalists and manufacturers.

Another disadvantage which we suffer from the lack of chemical knowledge is seen in mining operations. We have been quarrying mineral deposits and exporting them to Europe because we do not know how to make them into articles of use. The minerals that demand chemical treatment are not touched, but only those which can be readily and easily transhipped to Europe. The gigantic scheme of the late Mr. J. N. Tata to work iron ores, which have been allowed to remain undisturbed up till now, will, no doubt, in course of time, bring about a steady progress in our metallurgical undertakings and stimulate the growth of an extensive mining industry.

“The feature which stands out most prominently in a survey of the mineral industries of India is the fact that practically nothing has been done to develop those minerals which are essential to modern metallurgical and chemical industries, while most striking progress has been made during recent years in opening out deposits from which products are obtained suitable for export, or for consumption in the country by what may conveniently be called direct processes.”

“In this respect India of to-day stands in contrast to India of a century ago. The European chemist, armed with cheap supplies of sulphuric acid and alkali and aided by low sea freights and increased facilities for internal distribution by a spreading network of railways, has been enabled to stamp

out in all but remote localities, the once flourishing native manufactures of alum, the various alkali compounds, blue vitriol, copperas, copper, lead, steel and iron, and seriously to curtail the export trade in nitre and borax. The high quality of the native made iron, the early anticipations of the processes now employed in Europe for the manufacture of high-class steels and the artistic products in copper and brass gave the country a prominent position in the ancient metallurgical world."

"With the spread of railways, the development of manufactures connected with jute, cotton, and paper, and the gradually extending use of electricity, the demand for metallurgical and chemical products in India has steadily grown. Before long the stage must be reached at which the variety and quantity of products required, but now imported, will satisfy the conditions necessary for local production of those which can be economically manufactured only for the supply of groups of industries."

What line of action does this extract from the new *Imperial Gazetteer* suggest to us? What steps are necessary to develop our mining industry on a scientific basis? Instruction in mining and metallurgy, either in the existing colleges or in an Institute of Mining, will alone lead to the fulfilment of prospects our rich mineral deposits hold forth. By its means another great staple industry will come into existence and supply the people of India with commercial activity and remunerative work, and repay the cost of education thousandfold.

Our Government does not yet appear to have realised the necessity of creating a great Institute of Mining. The great work it is carrying on for the improvement of agriculture should be supplemented by some efforts in this direction, because all industries depend upon agriculture and mining. Its agricultural improvements will take time before they are universally adopted throughout India, but provision of instruction in mining and of facilities for the working of mines will give a stimulus to the prosperity of India and check impoverishment and destitution to which villages after villages have fallen victim through the changing conditions of the times.

We are fortunate in having big Native States to look after

our interests. If our Government does not shake off its tardiness, let us appeal to the great ruling princes of India to set apart a portion of their revenues to supply this great want. The money spent on it will be repaid by the enhancement of their revenues caused by the industries which will spring up in connection with the working of the mineral wealth which lies imbedded in their territories or in British India.

In this connection I have great pleasure in announcing to you that H. H. the Thakore Saheb of Morvi intends to establish a Technical Institute in his State. It will provide instruction in Technological Chemistry and in Mining and Metallurgy for which there is a great field and demand in India. The Institute will provide a higher standard of studies than that provided for at the Kalabhuvan.

Kathiawar and Cutch contain great possibilities of development for some chemical industries. The valuable deposits of salt and iron pyrites there hold forth bright prospects for the manufacture of soda and sulphuric acid—the two great pillars of chemical industries. The people of Kathiawar and Cutch do not lack enterprize. Let some of them divert their energies from the cotton trade and go in for these industries. If they do so, the favourable geographical position, rich geological formations and the patriotic interests of the chiefs will, within a decade, transform the two peninsulas into a great manufacturing centre, and drive out for ever the recurring famines which depopulate and paralyse some of the Native States.

For want of time, I have to leave off reference to important industries such as Tanning, Brewing, Glass and Porcelain and many others, which have a great future before them.

Indigenous Indian industries are characterised by the simplicity of tools and implements employed by the workers. The labour unit of Indian industry is small and the capital required for working that unit successfully is also small. Time has brought us, whose industries possess these characteristics, face to face with the modern achievements of Western Science, and its multifarious inventions in the mechanical, chemical and electrical branches. So, on the one hand, we have to produce on a large scale and to adopt the factory system ; but, on the other hand, we have also to rescue our

small industries and make them with the help of modern science a source of prosperity to our country. The question of cottage or village industries is one of the vital questions of our national life. There is some possibility of solving it, according to Professor Hobson,* if a cheap production of electric energy owned or controlled by the public can be cheaply distributed throughout India.

Let our industrial and political leaders concentrate their energies on the proper handling of a problem like this and solve it once for all. Many of the disadvantages we suffer from would thus find a remedy. Let our activities profit by the lesson the industrial history of the West has to teach to the world, that combinations for the maintenance of artificial prices, huge and lying advertisements and gross adulteration of manufactured products get rid of the efficiency in manufacturing operations by which every business should naturally stand or fall. † Let us not proceed on lines which have brought in their train misfortune and disaster. Instead of blindly following in the footsteps of Western manufacturers, let us adopt their latest methods of work, and introduce the systems devised to nullify the evil and disastrous consequences of those prevalent now. Let us bear in mind that the dominant factor of industrial success is just simple efficiency, by which I mean, "a combination of economy and progress in manufacturing operations." If we do this we shall not be handicapped in the competitive race of commerce but we shall be ahead of Western countries in proportion as we develop the nascent skill of our people and to the extent we make use of our resources.

We have undertaken a grave responsibility in meeting in such Conferences from year to year. The destinies of India hang on the practical results of our deliberations. Consequently, I may be permitted to suggest some lines capable of leading us to the desired goal. We must not only apply ourselves to the study of the industrial conditions prevalent in India and elsewhere, but should come to a definite conclusion as to the means and methods to be adopted to improve our condition in consonance with the highest developments of

* *Vide* "Science in Public Affairs",

† Professor Duncan's Chemistry of Commerce.

modern science. We should bring about the creation of all the facilities in India which the artizans, manufacturers and capitalists possess in the West. The economic and industrial museums, planned on the models of Europe and America, should be established in every important commercial and industrial centre.* Our annual exhibitions may form a nucleus from which the future museums may grow in conformity with local conditions and requirements. A collection of samples of foreign manufactures should be placed side by side with that of home-made articles, so that local artizans may have the benefit of cultivating their taste in the proper direction by comparative study. Their heads should be patriotic Indians who possess sufficient experience of the needs and resources of India ; they will furnish the requisite information and help our people to go in for new productive industries. It is unnecessary to add that commercial bureaus must follow as a corollary to museums. The reports prepared at these institutions should not only be published in scientific and technical English, which takes for granted a good deal of training, information and knowledge on the part of the readers, but also in the vernaculars and in a form devised to attract the attention of our people and to interest them in their contents, thereby inducing them to embark on the introduction or creation of new and profitable industries.

Our ancient guilds known as the Mahajanas in Gujarat have suffered disintegration with the permeation of British influence in India. The services they performed as social and commercial forces were great, but now they have fallen into disuse. It is time that new guilds should be organised to meet the requirements of the times. They shall have to attend to the organisation of their industries, the creation of facilities in the shape of museums, bureaus, technical institutes, industrial banks, etc., to guard the interests of industrial centres and communities and to undertake industrial surveys in special directions. Our Conference will render a very important service to the industries of India, if it takes up this question of the formation of guilds seriously.

Only the Government has the means to carry out general industrial surveys. If they are properly carried out and their

*Refer to my Museum Notes.

results placed within the reach of the teeming millions of India, the British Government will confer a great benefit on them. Our native Princes may also be approached to come forward to help our industrial advancement by instituting economic surveys in their states. Our industrial development will be stimulated if surveys of particular industries are carried out instead of planning a general survey. H. H. the Gaekwar entrusted me, some years ago, with the work of making a survey of the dyeing and calico-printing industries. This survey proved of considerable help to me in my subsequent work for the revival of the dyeing industry in India.

Before making my suggestions on the last but important factor of our industrial regeneration, I have a pleasant duty to perform. Our Conference has been fortunate enough in securing as its President my friend, Dewan Bahadur Ambalal Sakerlal, who is a distinguished alumnus of the Bombay University, a staunch political leader of Gujarat and one of the captains of her flourishing mill industry. His high intellectual attainments, varied experience of life, keen and penetrative grasp of our national problems will, I am sure, give a practical shape to our deliberations. The Industrial Conference is a practical offshoot of the Indian National Congress. We who have assembled here to-day are all practical men and naturally anxious to work ; we are idealists too : the industrial efficiency and expansion of India will be the realization of our ideals, if we put our shoulder to the wheel and work day and night for the amelioration and progress of our country.

Ladies and gentlemen, I have laid great stress on Technical Education, and again I revert to it because it is the lever of industrial progress to which our activities must be seriously and vigorously applied. We must organise a national system of technical education with the help of industrial guilds which will formulate technical courses to meet local needs, start institutions where instruction in them can be provided, and to raise funds to equip and finance such institutions. Let us all—all the workers in the onward march of India—rally round the banner of Education, and leave no stone unturned to increase the brain-power of our nation. Let us not wait for Government initiation in this matter. We must take our

destinies into our own hands, and the Government is sure to help us when we help ourselves. Let us study the national forces of England, Germany and America, in order to be enlightened as to the means and measures we should take for the regeneration and development of our industries. Without universal education, there is no salvation for us. We must undergo an intellectual revolution ; our outlook of life and our present conception of mundane duties must be modified, if we want to remain as a nation and a nation full of youth and prosperity as in the days of yore. "Educate, educate, educate" must be the cry heard on all sides. Listen to the words of wisdom the present Secretary for War in England utters : " Science," says the Right Hon'ble Mr. Haldane, " is essential to victory, whether the struggle be in the arts of war or in those of peace. Organisation is the key to success ; organisation depends on steady thinking, and thinking depends on ideas—ideas which give birth to ideals. For inspiration as well as guidance, those engaged in enterprise of every kind look more and more to the trained mind. They are forced to do so.....We are learning that nothing can be accomplished on a large scale without the indispensable preliminary of first taking thought. And we are learning that the taking of thought requires at every turn, not only the expert, but the highest type of expert knowledge."* Then he goes on to show the great importance talent has attained in the modern world :—

While speaking at Wakefield on October 17 at a public meeting held in connection with the Wakefield Education Guild, he said : " Higher education is of great value to those engaged in industrial pursuits, in fact it is of value to the whole nation. Learning for learning's sake is a great text, and it does not shut out the utilitarian side. The profits of industrial enterprise go to the man of brains, to the man with the power of direction. This shows that it is vital to those engaged in industrial enterprises that they should have command of science and as much knowledge as they can get. Unless knowledge is spread among the people there cannot be equality of opportunity. There is only one leveller, only one man who does anything substantial to make people equal, and that is the school-master. Education in this country will never be right until the elementary school, the secondary school, and the university are linked together. The British people perhaps need education more than any other nation. We are very prosperous ; we are very self-reliant ; we have magnificent

* " Science in Public Affairs."

energy ; if we had not, we should have been distanced in the race. But we are competing against science and the increasing knowledge which science gives. We are being more and more handicapped in the race, and it is our own individual powers that have enabled us still to get to the goal in front of our competitors. Let us learn before science makes still further advances, and before they are appropriated by foreign nations to bring ourselves at least up to this level."

Shall we rouse ourselves to the consciousness of the urgent need India stands in for trained skill and scientific thought ? Shall we fritter away our energies, miss our opportunities, waste our resources in worthless and idle quarrelings for personal glorification, in idleness and inaction, in the practice of ideals detrimental to our progress, and take no steps to diffuse universal scientific education leading to a stupendous moral and intellectual revolution ? Shall we remain satisfied with our industrial degradation and dependence and the increasing poverty of the masses, to be crushed in the struggle for existence and to be cursed and condemned by our posterity for the disgraceful legacy we shall bequeath to them ? Shall we rely upon our rulers, when, as Mr. Haldane observes, they are themselves outstripped by Germany, America and other countries which have taken the fullest advantages of the progress of modern knowledge? It ought not to be so. We must make up our mind to found institutions for technical education and thereby raise our material condition. No progress is possible in the absence of material prosperity. No moral development, no intellectual achievements have taken place in countries where the material condition of the people is at a low level and where consequently life is a bundle of pessimism, inertia and apathy. We must not rest until temples dedicated to Saraswati and Viswakarma, *i.e.*, colleges and polytechnics outnumber all the temples, mosques and churches which minister to the supposed spiritual needs of the people. Our religious charities must be directed towards supplying us with brain-power. On brain-power depends the regeneration of India, her prosperity and integrity and also her salvation. I have great faith in it, and have devoted the best years of my life to the imparting of education. I have always looked upon it as the great panacea for all the misfortunes we groan under.

The earnestness, sacrifices and martyrdom of some of our

people have ushered in a new era in the history of our nation. We are all pulsating with a new life, new ideals and new vigour. Let us sanctify the birth of this new life by providing for universal education in India. Let us not wait for large funds, but begin with whatever sums we get from our people. Let earnest and influential workers come forward to persuade our native chiefs, merchant princes and our middle-classes to set apart a portion of their revenues and incomes for educational purposes in the same way as they do to satisfy their religious cravings. Education is a religious duty, and let us gird up our loins to perform it to the best of our abilities.

I again accord you all a most cordial welcome to Surat on behalf of the Reception Committee. Surat has caught the spirit of the times and embarked on industrial activity. Let the same spirit inspire us to fulfil the mission which has brought us together. Let us thoroughly and systematically carry out the conclusions we arrive at. We have the necessary means present in abundance in our land; we have capable men in our ranks; we have the guidance offered by the history and experience of England and other nations; why should we then hesitate to work out our industrial salvation? If we neglect the present opportunities, we shall have to pay a very heavy toll in future for mere existence. Let this dismal and depressing prospect spur us on to action, to stimulate and accelerate our industrial progress. If we will, we shall bring about our regeneration. With knowledge, with self-confidence, with determined action and with united endeavour in the sacred cause of our motherland, let us, ladies and gentlemen, resolve to work out our own regeneration. (*Loud cheers.*)

Election of President.

Mr. N. SUBBA RAO PANTULU (*Rajahmundry*), then said, in proposing the election of the President :—

Mr. Chairman and Gentlemen,—It is my pleasant duty to propose for the Presidentship of the Third Industrial Conference one who is so well-known in this part of the country, one who, after his retirement from the Chief Judgeship of the Baroda State, has devoted the evening of his life, if I may be permitted to say so, for the industrial development of the country. He is a close student of Economics, he is closely

connected with the mill industry of Ahmedabad and Surat, and he takes deep interest in all that appertains to our welfare. And need I mention his name—the name of Dewan Bahadur Ambalal Sakerlal Desai, who has kindly consented to honour this Conference by accepting its Presidentship and to guide our deliberations. I therefore propose that Dewan Bahadur Ambalal Sakerlal Desai be elected President of the Third Industrial Conference. (*Cheers.*)

Dr. HAROLD H. MANN (*Poona*), in seconding the proposition, said :—Gentlemen,—It has been suggested that I should second this proposition. It is with the greatest pleasure that I stand to do so, first because I know Dewan Bahadur Ambalal Sakerlal for his enthusiasm for Industry ; secondly because I know him to be so since I began to know him. Hence, I have very great pleasure in seconding the motion that Dewan Bahadur Ambalal Sakerlal be elected President of this Third Indian Industrial Conference at Surat. (*Cheers.*)

Mr. BEZONJI M. JAMBUSARIA (*Surat*), in supporting the proposition, said :—Mr. Chairman,—As a citizen of Surat, I have great pleasure in seconding this proposition. Gentlemen, you do not need many words from any of us to commend this Resolution to you for your favourable consideration. Dewan Bahadur Ambalal Sakerlal is one of our country's foremost men in this part of India. Until about a few years ago his mouth was muzzled. But since his retirement from the Baroda Government service, his energies have found a remarkable scope in various directions. His sympathy with every national movement, industrial as well as social and political, is well-known. But his sympathy is of a practical kind. You cannot say of him as might be said of many a sympathizer. He has identified himself with many an industrial institution. He is a man of sound judgment and of a large experience of the world and a close student of the problems of the day. I have no doubt that you cannot make a better selection. I therefore ask you to carry this Resolution whole-heartedly and with acclamation. (*Cheers.*)

The Chairman of the Reception Committee put the Resolution to vote, and it was carried unanimously and with acclamation.

Dewan Bahadur Ambalal Sakerlal then took his seat in the Presidential Chair and delivered the following Address :—

• **The Presidential Address.**

GENTLEMEN,—I thank you sincerely for asking me to preside at this important Conference. I cannot claim the practical experience of trade and industries possessed by my worthy predecessor, nor the literary eminence and broad economic outlook of Mr. Romesh Chunder Dutt, the first President. My connection with industries is indirect, and my studies in Indian Economics are somewhat recent. I beg, therefore, that you will be good enough to take an indulgent view of any shortcomings in the observations that I offer for your consideration.

The fundamental facts of our economic situation are well known : (1) Wide-spread and chronic poverty among a large proportion of the population ; (2) dense ignorance of the masses ; (3) an abundance of raw materials ; (4) absence of scientific and technical knowledge and practical skill ; (5) a low state of commercial enterprise ; (6) a large deficiency of capital. The question that we are called upon to consider is how to evolve a state of widespread industrialism out of the conditions just postulated.

Some of the remedies suggested are those that have proved efficacious elsewhere, *viz.*, a wide provision of elementary education ; foundation of technical schools and scientific institutes ; establishment of commercial schools, and acquisition of scientific and technical knowledge by students sent abroad. All these are comprised under one comprehensive head—Education. The efforts made till now to supply it have been spasmodic and feeble. But strong, systematic, and sustained exertions are indispensable. They ought to be continually re-enforced by a strong national spirit that is determined to achieve success at all costs, and is immovably steadfast in the pursuit of its high national aim of securing our industrial regeneration.

In the meanwhile we must depend for our immediate progress on our resources as they now exist. Our merchants are indeed mostly ignorant of the intricate ramifications of modern industrial conditions, their vast extent, and the foundation on which they ultimately rest. Happily there arise now and then above our economic horizon a few persons of

the towering eminence of the late Mr. Jamsedji Tata ; and commercial enterprise on a considerable scale has existed in Western and North-Western India from time immemorial. Our traders have penetrated into East Africa, Persia, Turkey, and eastwards into China and Japan. Merchants of Gujarat have recently gone to England and opened agencies there for the purchase of British machinery and mill-stores. Hindu pearl merchants have lately established firms in Paris and London. The Indian Specie Bank of Bombay has quite recently opened a branch under Indian management in the heart of the British Empire. It is to such agencies that we must look for the immediate help that we require in the shape of commercial enterprise.

CAPITAL.

Next to the want of commercial enterprise and industrial knowledge, the thing that stands in the way of our industrial growth is the absence of the requisite capital. Nay, it may be asserted that the want of capital is now our chief desideratum. It is true that the capital now employed in our cotton industry amounts to nearly 30 *crores* of rupees. But if we remember our final aim, *viz.*, to clothe ourselves wholly with home made fabrics, we must confess that we have only made a fair beginning for a general regeneration of our industry. The great problem awaiting a practical solution is that of raising the necessary funds.

The question admits of a satisfactory solution, provided our best minds apply themselves to the task. The rupee debt of the Government of India held in India amounts to Rs. 105 *crores* ; and of this Rs. 55 *crores* are held by Indians. It may not be possible to divert all this into the channels of trade and industry, but even if you could secure for the latter purpose $\frac{1}{4}$ th of it, say Rs. 14 *crores*, the impetus imparted to our industries would be very great. It is to be wished that Indian publicists will earnestly endeavour to create a public opinion in favour of the diversion. That it is quite within their power I have no doubt. The higher returns of trade and industries ought to prove a strong argument in favour of the change.

There is another and a cognate source which may well be tapped by our enterprising men. The amount deposited in the Postal Savings Bank was for the year 1904-05, Rs. 14 *crores*.

Nearly 13 *crores* out of this sum were purely private Indian savings. Now if you could succeed in getting even a half of this sum, say Rs. 6 *crores*, for our commercial purposes, an amount of strength would be imparted to our industrial activity, of which we have at present no adequate conception.

The best way of fulfilling the latter purpose, as well as that of getting at the money now locked up in Government Promissory Notes, would seem to be the establishment of Banking institutions all over the land. Efforts on a small scale have already been made, notably in Poona, Ahmedabad, Benares, Lucknow, Lahore and other places. But these are tiny beginnings of very large potentialities. There is no reason why every town of importance should not have a Bank of its own. These small institutions may establish connections with the bigger ones at large commercial centres, and the whole capital of the country will be thus utilized to the best advantage.

It may be here stated in passing that it is not at all a difficult thing for men of character to inaugurate such establishments. In fact the great thing to be remembered is that there is no department of business for which Indians of the middle classes are better fitted by heredity and past traditions than that of banking. Practical bank management requires just those qualities in which we excel and which we have cultivated for generations, *viz.*, patience, calculation, foresight, thrift, and the like. We have further a natural advantage over our foreign rivals in this respect, *viz.*, we possess an intimate acquaintance with local conditions and with individual solvency.

A satisfactory beginning has already been made as regards large banking institutions. Bombay has started two large banks, Madras has launched its Indian bank, and Calcutta is following in ~~the wake~~. These institutions have already proved of great value to trade; our Indian genius for banking is so far full of promise. We want now a network of small banking establishments which will act as feeders to the bigger banks. One of the principal functions of these small banks will be to inspire confidence in the poorer population, and to attract the sums that now lie idle or concealed underground owing to distrust and ignorance. Education

alone can finally remove the economic blindness which favours hoarding. But small well-managed banks can do a great deal in the meanwhile.

It is clear, however, to all who take a comprehensive view of the present industrial situation, that Indian productive industry requires more capital than all the ways just mentioned can be expected to secure. The question arises whether we should resort to foreign countries for loanable capital, or prefer to wait till our resources grow equal to our wants. There is a strong feeling among a section of our people that foreign capital should be shunned. Similar was the feeling of some Japanese patriots formerly. The sentiment is natural. But our interests require that we should look at the matter from a purely business point of view. From this standpoint, the only reasonable rule of conduct to follow is that we should freely borrow money of foreigners for industrial purposes. The Government of India has been long doing this for Railway construction. Very powerful nations go to the markets of London and Paris for war loans, or for naval construction, and also for industrial development. There is no reason why we should not do the same.

The Honourable Mr. Vithaldas, my worthy predecessor in this chair, urged the same view. "We cannot," he said, "do without foreign capital. It will be extremely short-sighted to reject it on sentimental grounds. We must avail ourselves of it, but we must take care that we do not pay for it more than other nations." This is sound advice. In this respect we might follow the example of our fellow-subjects of Canada. Patriotic Canadians welcome the advent of American brains and money in the development of Canada ; but they naturally prefer that the work now being done by the capitalists of the United States should be shared in a vastly greater degree than now by those of their own countrymen who have money to invest.

THE SWADESHI MOVEMENT.

The new propaganda termed the *Swadeshi* movement requires some remarks. The aim of this movement is the establishment of new industries in India, by means of Indian capital if possible, so that the Indian people may be, as far as

is practicable, self-contained and independent of the foreign imports that now flood the land.

The justification of the movement consists in the fact that the country has been impoverished during the last century by the inroads of outside manufactures on its old industries, so that it is now unable to supply its population even with the necessities of life. The foreign goods now imported are not, economically speaking, indispensable. The materials of many of them are produced in the country, and an ample supply of labour is ready to hand. The *Swadeshi* movement ultimately seeks to call into existence the directing capacity, the technical skill, and the requisite capital, so that our own labour and money may convert our raw materials into the commodities which we now import.

There is a general consensus of opinion that the endeavour to establish new industries in India is very laudable in itself. The Government of India favours it. Every new factory established, every banking institution created, every steamship launched, is hailed by men of all shades of opinion. Scholarships for obtaining technical instruction outside the country are given to a small extent by the Government of India, to a larger extent by public bodies and public-spirited citizens, while many enterprising and high-spirited youths go abroad at their own expense to acquire high-technical proficiency. So far there is no radical difference of opinion.

Honest and patriotic men all over the country are trying their best to induce our countrymen to abjure the use of foreign goods altogether, or in favour of indigenous ones of the same description. These earnest efforts, which are gradually spreading over all parts of the land, are viewed differently by different persons. So far as the methods are accompanied by unlawful acts of violence and intimidation, they deserve to be severely condemned. But unlawfulness apart, there is nothing in them that any honest man can seriously object to. The economic ideas of men differ in many points, and a difference on this one is allowable. But no candid man ought to stigmatize these patriotic efforts as dishonest. They are perfectly legitimate.

But the statement may be ventured that, even from an economic point of view, they are not only justifiable but

urgently needed. The protection of new or nascent industries by means of high import duties and by bounties is held to be allowable by some of the highest authorities of the free trade school of Political Economy. If the State in India had been identified in economic interests with the Indian people, some measure of protection might have been adopted by it long ago. But the Government of India being the representative in India of Free Trade, Britain is not at liberty at present to afford economic protection in any form to Indian industries. The people of India ought, therefore, to step into the vacuum, and do by *voluntary protection* what the State might have achieved in an easier way by tariffs and bounties. Thus the *Swadeshi* propaganda is in its essence an endeavour to reinforce the cause of Indian industries by enlisting the Indian patriotic sentiment on its behalf. It is difficult to see how any objection can exist against such a move. Organized voluntary efforts are specially needed now in all departments of national activity. The *Swadeshi* movement is the application of this principle to that of national industrial regeneration.

In finally determining the utility of the movement, our view need not be restricted to the free trade formulæ of English economists. Almost all the independent nations of Europe and America are at the present day encouraging their own industries by means of high tariff barriers and bounties. Germany and America are the two most prominent instances before us. Why should not Indians do by voluntary effort what these two nations are doing by the collective action of their States?

That this line of conduct is correct is proved by actual experience. The Finance Minister in his Budget Statement last March recognized that the *Swadeshi* movement had resulted in the contraction of imports of cotton goods to the tune of more than a *crore* of rupees, indigenous manufactures having replaced them. An impetus is given to the handloom industry in Bengal and elsewhere such as it had not felt for nearly a century, and large numbers of our countrymen have obtained a living thereby. There is an all-round industrial revival due to the *Swadeshi* propaganda. Fifteen banks with a total capital of nearly 4 *crores* have sprung into existence. Five navigation companies with a capital of 121 *lakhs* have been started. Twenty-two new cotton mills with a capital of nearly 2 *crores*

have been established. Two jute mills, several oil pressing mills, sugar factories, and mining and mineral companies, besides many that are not known, have been launched. (These figures are taken from R. B. Lala Baijnath's speech at the U. P. Conference.) In the department of cotton spinning and weaving, the number of spindles has risen from 50 to 60 *lakhs* and of looms from 45 to 60 thousand. These gratifying results are largely attributable to the *Swadeshi* propaganda, and to the *Swadeshi* spirit which it has aroused. In the face of these results it is not reasonable to cavil at the *Swadeshi* movement.

There are well-meaning people who urge that the propaganda imposes an extra burden on the poor or that it deteriorates taste and workmanship. Now it is not always true that any extra burden is suffered by our poorer countrymen on account of the *Swadeshi* movement. In several cases the propaganda has been only the means of advertising widely Indian goods of admirable quality and cheapness which were languishing for want of support. In some cases the preference for our own goods has indeed implied a small and often imperceptible sacrifice. But all protection implies such a sacrifice. When a State imposes a high tariff against foreign imports to bolster up a nascent industry, the sacrifice is equally real. Why should it be grudged because it is voluntarily borne? As to taste and quality, it is not always the case that the Indian article is inferior to the foreign. Often the reverse is the fact. The element of durability again is generally in favour of our products, and often goes far to counterbalance the loss in point of superficial finish. Lastly, there is no ground for the fear that patronizing crude articles will cause a permanent deterioration of our workmanship. Such patronage can at the best be very temporary, and competition among our own producers is bound in the long run to keep up the quality. The poor ultimately gain by the extended employment that arises for their labour.

Of the four elements of national manufacturing prosperity, *viz.*, raw materials, technical skill, capital, and demand, the demand is the dominating factor which gives direction, shape and substance to productive activity. Now our resources in raw materials are abundant. Technical skill can be created gradually, and for our immediate purposes we can

rely upon importing it from outside. I have already dwelt upon the question of augmenting our capital. As to demand, it is very extensive in India. Thus all that is necessary to do at present is to make the demand flow in such a way that it may fertilize native industries instead of foreign ones. All the foremost nations of the world are endeavouring at present to get wider and wider markets for their goods. Their political action is largely governed by this policy. In their mutual jealousy and competition they insist on an open door for all, notably in the vast Asiatic countries. The ordinary weapon used by these nations is that of making their goods cheap to the consumer, of lessening the cost of transport by subsidizing shipping lines, of practising economies in production and utilising scientific inventions. They rely in the last resort on an appeal to the *avarice* of the foreign consumer.

Now it is permissible to inquire why a nation situated like ours, and deprived of all means of enforcing its will by collective action, may not seek to extend its industries by appealing to a higher sentiment than avarice, *viz.*, Patriotism. Even Royal personages have commended such an appeal and enforced it by their example.

RAILWAY TRANSPORT.

The question of a cheap and quick transport of our manufactured goods and machinery from one part of the country to another has not received the attention it deserves. It is, however, of vital importance to the growth of our industries. The utter collapse of the carrying capacity of the principal Railway lines last season is fresh in our minds. It caused enormous losses to traders and producers and a serious dislocation of all commercial arrangements. A sufficient supply of rolling stock on each line is a *sine qua non* of Railway efficiency and ought to be insisted on. Smooth working arrangements for interchange of waggons between the various lines are also badly needed. The Railway staff ought to be imbued with the spirit of business. The Railway Board has succeeded, indeed, in effecting a few minor improvements, but is still far from coming up to the expectations of business men. The delays in the dispatch and handling of goods after arrival are often scandalous. For example, it generally

takes eight days before goods loaded in Bombay reach the hands of the consignees at Ahmedabad, which is only 300 miles from Bombay. The loading and unloading arrangements at byestations are defective and add to the delay. Mr. Morley made a boast that the Railway rates in India are very cheap. They may be cheap. But there is great room for improvement still. Now it costs nearly Rs. 15 (all charges included) per bale of yarn or cloth sent from Ahmedabad to Cawnpore or Calcutta ; while it can be sent to the latter place by rail and sea combined for nearly half the sum. The Railways yield a large surplus revenue after deducting interest and wear and tear of the fixed capital. Why should not this surplus be utilized to reduce the freight charges on all internal manufactures ? A reduction in freights acts on trade like fresh capital on a new market. It is as new blood to a living organism. It is by cheap and quick transport that America has achieved her industrial pre-eminence. Indian manufactures need very cheap freights and rapid transport. I would commend this point to the earnest consideration of the Conference.

UNIFORM WEIGHTS AND MEASURES.

Somewhat akin to the question of cheap railway freights and quick transport is that of having for the whole country a common currency and common weights and measures. The existence of important Native States, some with a standard coin of their own, accounts for the difficulties that confront us in the way of getting a common medium of exchange. Political considerations are here interwoven with the economic problem. Maharajah Sayaji Rao of Baroda has generously adopted the British coin ; and it is to be hoped that equally broad views will influence the counsels of Gwalior, Hyderabad and the Rajputana States in this important matter. It is the poor people of the Native States and travellers that suffer most from the existence of a separate local currency. There is less reason, however, for maintaining the present confusing labyrinth of weights and measures. Big traders can always protect their interests ; and it is the poor and the ignorant that suffer most. The necessity of developing the domestic commerce of our vast country makes the question of a common currency and common weights and measures one of national importance,

AGRICULTURAL INDUSTRY.

I will now, with your permission, proceed to offer a few remarks on some of our leading industries, and, among these, Agriculture first demands our attention. It stands at present at the head of all our other industries. An extension of purely industrial occupations will no doubt reduce its relative magnitude. But it will be a long time before its place becomes secondary as in England. It behoves us, therefore, to pay special attention to it. The greatest impediments to its growth are—(1) the ignorance of the peasant; (2) his heavy indebtedness; (3) the irregularity of the rainy seasons; (4) the absence of irrigational facilities; and (5) the land policy of the Government. The charge of blind conservatism brought against our cultivator is not fully justified. He has always shown a readiness to produce crops that pay him best, and due regard being had to his indebtedness, he cannot be expected to do more. The Government of India have of late taken some steps to improve the returns of agriculture. But, as usual, they have begun at the top instead of at the bottom. Something more is needed than having big central institutions or associations. Big central associations have failed in Bengal, and cannot expect a better fate elsewhere. The theory that knowledge will filter down to the peasant in his village from the central institution or bureau is not supported by actual experience. There are thick impervious strata intervening which prevent the desired percolation. The villager ought to be approached in his home and placed in possession of the knowledge which he lacks. For this village committees should be formed, and model farms ought to be established for every small group of villages. Trained Indian experts ought to be brought into direct contact with the peasant. Lastly, the interposition of the Revenue agency ought to be sedulously shunned. As regards the peasant's indebtedness, a further expansion of the cooperative credit associations ought to be encouraged. In the matter of irrigation large works are good in their way, but the old system of having a good storage tank for every village deserves to be revived. Free education, and that of the right sort must be placed within the reach of the agricultural population. Finally, the present land policy of

periodical settlements must be abolished, and a permanent land tax ought to be fixed.

THE COTTON INDUSTRY.

The cotton industry is next in importance, but stands on a different footing altogether. We get almost all the raw material for it in our own country, and spare some of it for foreigners. Egyptian and American cotton is now annually imported in small quantities, and these imports will increase during the present year. The cultivation of the new Sind cotton promises, thanks to the liberal initiative and help of the Bombay Government, to give great impetus to our staple industry. Our Millowners' Association may fairly be expected to show a practical appreciation of the efforts of Government by offering prices to growers of long-stapled cotton in other parts of the country. Meanwhile it is agreeable to note that the cotton industry is now on a firm basis, though we are yet far behind our legitimate place in the production of cotton fabrics. The system of paying the managing agents huge commissions calculated, on the outturn alone, is happily getting into public disfavour, and a more sensible one is gradually taking its place. The labour supply is unsatisfactory from a variety of causes, plague being the main one. The public can now justly demand that the excise duties on cloth, which have trebled during the last 10 years, and now amount to nearly 30 *lakhs* of rupees per annum, should be abolished. The increasing revenue from excise on cotton cloths involves a new danger to the industry, to which the attention of all publicists might be invited. At present the interests of Lancashire form the sole pretext for the impost. But if the revenue from it grows at its present rate, considerations of finance are likely to be utilized for its continuance. It will be said that the amount is too large to be at once remitted. This is an additional reason for taking concerted action now to get this obnoxious tax removed. At the same time we have a right to expect that the industry shall not be allowed to be threatened with new artificial restrictions on any grounds whatever. Whilst on this subject, we must thankfully acknowledge that the composition of the Factory Commission now sitting is quite satisfactory. We may be permitted to hope that the interests of India alone will dominate its final recommendations.

IRON, COAL AND MANGANESE.

It is a pleasing feature of the new industrial spirit that Indian merchants are turning their attention to the mining of coal and manganese. It is gratifying that recently a few coal and manganese concerns have been launched by Indians with Indian capital. Ignorance had hitherto hindered our progress. To ensure future progress it would be well if steps were taken to train Indian experts in geology, mining and metallurgy. The suggestion put forward last year by the Hon'ble Mr. Vithaldas, *viz.*, that all companies formed outside India for mining should be compelled by Government to reserve a portion of their stock for Indian investors, is worthy of consideration. The difficulty lies in the fact that rich foreign capitalists are satisfied with a smaller return than Indian investors, and that the latter generally fight shy of uncertain investments. The Tata Iron Works mark an epoch-making advance in mining and metallurgy, and are pregnant with very far-reaching results.

THE SUGAR INDUSTRY.

The United Provinces of Agra and Oudh supply half the home-grown sugar. But it is now becoming clear that our sugar production is losing ground in competition with that of Java, Mauritius, and Germany. The *Swadeshi* agitation is trying to enlist the religious scruples of the people in favour of native sugar, but the practical question of extending the indigenous industry remains unsolved. Perhaps Mr. Hadi's new way of making sugar may aid in the solution. More irrigation works may hasten the desired result. The difficulty of getting sugarcane all the year round is at the root of the question. It is not easy to suggest a remedy. The refinement of molasses, however, pays fairly well, if the manufacture of rum as a bye-product is permitted by the State. Our patriotic countrymen are however in earnest, and Madras is going to have a sugar factory soon.

JUTE AND SILK.

The Jute and Silk Industries are at present confined to Bengal; but the Jute Mills are financed and managed by Europeans. We on this side of India are unable fully to understand the latter phenomenon. There is no reason why

awakened Bengal should not claim a share in this thriving industry. In the article of silk, Bengal has a practical monopoly, though Kashmir is preparing itself to enter the lists. Praiseworthy efforts are made in Mysore to produce silk on a commercial basis. Maharajah Sayaji Rao, the enlightened ruler of Baroda, has taken the question in hand for the benefit of Gujarat. A Deccan Brahmin who has returned from Japan after studying sericulture in all its branches has, it is stated, started a small and successful factory of his own in the Konkan. It is to be hoped that his bold example will find enterprising imitators elsewhere.

LEATHER, PAPER AND OTHER INDUSTRIES.

The leather industry is gradually spreading, though no impression seems to have been made on the imports as yet. The efforts of Mr. Chatterton of Madras in this direction are deserving of great praise. But the field for leather manufactures is still very extensive, for we export skins and hides of the value of Rs. 14 *crores*. A factory at Navsari and another at Bombay, both lately started, are doing good business. There is no reason why every province should not have a leather factory of its own. The new Alembic Chemical Works at Bombay mark a valuable departure, which is pregnant with important results in the immediate future. The glass works at Umballa, Dehra Dun and Bankipur are among the offspring of the new *Swadeshi* spirit in British India. Cheap Railway freights are especially necessary in the case of glassware. Enamelled ware and pottery have been taken in hand by patriotic Bengali gentlemen, and the Victoria Technical Institute at Bombay trains young men in enamelling. Surgical tools of excellent finish are now produced locally in Bombay and sold at a reasonable price. A tobacco factory near the same place must be reckoned among the progressive works of the year. There is, of course, abundant room for these industries all over the country.

HOME INDUSTRIES.

The question of creating home industries for our rural areas is one deserving of serious consideration. For more than six months in the year almost the whole agricultural population of unirrigated tracts is absolutely without any employ-

ment. It might greatly improve their material condition if some handicrafts suitable to their needs could be successfully introduced into our rural areas. The handloom may answer the purpose in many cases. Knitting and lace-making also suggest themselves. The matter is very important, and suggestions or papers dealing with it ought to be invited.

EDUCATION.

No review of national industries can be complete without a reference to the subject of Education. I have touched upon the deficiency of the labour supply for factories. Agriculture makes the same complaint. Plague is no doubt one of its principal causes, but there are others of a deeper kind. The labourer in the principal industrial centres gets higher wages than he can dispose of according to his present ideas. He is very ignorant and his wants are few. He squanders a considerable proportion of his earnings on liquor and also on flimsy foreign finery. If he still has money left he deliberately absents himself from work till his pocket is again empty. In the meanwhile his dwelling continues to be insanitary, his load of debt remains undiminished, and his food also remains the same as before. It is absolutely necessary, if his condition is to be really elevated, that he should receive a sound elementary education. It is the duty of the State as well as of the rich to provide this as extensively as possible. From an industrial point of view, it is as much needed as from any other. The quality of this ought to be such as will make him physically robust, and mentally and morally equal to his foreign competitor.

The need of technical education on a broad scale is now equally acknowledged. The Government might be reasonably expected to take the lead ; but the question is a national one, and the whole nation ought to combine to provide it. It is our own problem, and we should apply our shoulders to the wheel to bring about the desired result. The difficulty of getting the funds is not so great as is imagined. How to begin is practically a more difficult matter than the raising of funds. Each province, in fact each district, ought to decide the lines of industry for which it will provide industrial and technical training for itself. Bengal, for instance, might select the

industries of silk, jute, tea, and indigo ; the United Provinces sugar, glass, and woollen manufactures ; Bombay, cotton and woollen; and so forth. The manufacture of leather ought to be taught in all the provincial schools. Similarly mechanical engineering, electrical engineering, and industrial chemistry might form the subject matter of instruction in all our technical schools. The point to be constantly kept before the eye in all these endeavours is that there ought to be a living connection between the technical school of a district or province and its actual or projected industries. When each province has at least one technical school of its own, it will be time to think of a big and all-embracing polytechnic institute for the whole of India. Further, all industrial progress ultimately depends on scientific knowledge. It is to be hoped that the Tata Research Institute will serve as the head reservoir that will perpetually replenish all the technical institutions of the country with the freshest achievements of science and art.

The requirements of the productive industry will be met by a provision for a course of education just indicated, but to complete our national equipment industrially, a school or college providing a full commercial course is very much needed. Among the subjects that may be taught in such an institution may be included national and cosmopolitan political economy, private and public international law, commercial law, the commercial policy of the leading nations, one or two foreign languages, commercial and political geography, and statistics of trade and commerce, of agriculture, manufactures, and mining, and, lastly, currency.

CONCLUDING REMARKS.

The usefulness of this Conference is now placed beyond question. It effectually focusses the interest of the public in our industries, which are a matter of vital importance to the whole nation. The very able papers written by gentlemen possessing special expert knowledge which this Conference has been the means of evoking form by themselves a mine of valuable information. The Directory of Indian Goods, which may be claimed as the special work of our indefatigable Secretary and his staff, is a production of great practical utility. By making it the medium

of advertisement for our producers and *Swadeshi* consumers, its scope will be greatly enlarged. The exhibition of Indian products which has been abandoned this year for unavoidable reasons will, it is hoped, always form an adjunct to our annual gathering. It is a question whether the annual exhibition may not be taken up by the Conference—of course with the help and active co-operation of the Congress Reception Committee. The idea that the Exhibition is a mere show is not borne out by facts. Producers exhibiting their goods have obtained a degree of publicity for them which would have been otherwise hardly attainable. Further, it makes the materials for a comprehensive directory of Indian goods easily accessible. While a considerable proportion of the visitors must be sight-seers, there is always an important but increasing minority who benefit by it even commercially. A few foreign rivals may perhaps derive advantage from it. But industrialism is now an international race, in which the fittest will win. At the same time we are always ready to adopt suggestions for making it widely beneficial.

It will be well if each separate province is able to have its industrial conference as the United Provinces had lately. There is much that is common to all the provinces, besides certain matters that are more or less local. It is for the Indian Industrial Conference to deal with the general topics, and also to offer suggestions even to local conferences.

While the lines of work hitherto pursued may be continued with advantage, it will arouse and sustain general interest, if practical aims are associated with our labours. The prizes for an improved handloom are very appropriate. The Conference may similarly encourage the acquisition of specialized practical knowledge in directions suggested by those who are in touch with industries. The encouragement may take the shape of scholarships, of prizes for proficiency in advertised subjects, or for monographs on particular industries that now await practical action. For these and other purposes that may be named large funds are needed. Is it patriotic to wish them to come from outside sympathizers? Can they come from other people? Has any nation ever been industrially regenerated by external help? There are many here who, I am sure, would proudly spurn the idea of receiving

such assistance. Let us never forget that Nations are made by themselves. In this as in all our activities, self-help and self-sacrifice ought to be our watchwords. Let every patriotic Indian who feels for the existing poverty of his country honestly contribute his mite, and exert his best to get others to do the same. To quote His Highness Maharajah Sayaji Rao's words, "To help in the industrial movement of the present day is a duty which devolves on all equally." Let us then earnestly act in this spirit, and ample funds will be always at our disposal. (*Loud and prolonged cheers.*)

Rao Bahadur R. N. Mudholkar, the General Secretary of the Industrial Conference, then presented the Annual Report, which was adopted on the motion of the President.*

The President then read a list of the papers, and said that those writers of papers who were present at the Conference would read their papers, the rest being taken as read.

* The Annual Report is printed in this volume after the proceedings of the Conference,

PAPERS.

THE SCOPE AND METHOD OF AN
INDUSTRIAL SURVEY.

By A. C. CHATTERJEE, Esq., I.C.S., *Officer in charge of
the Industrial Survey of the United Provinces, Lucknow.*

The organisers of this Conference have done me the honour to request me to contribute a paper on the need of an Industrial Survey. It has seemed to me, however, that it would be supererogatory labour to expatiate before the members of this Conference on the necessity of an industrial survey of the different parts of India at the present time. The need has already been emphasised by many conferences and associations. Much attention has also been devoted to the subject by the Imperial and the various Provincial Governments. At the instance of the Government of India a series of industrial monographs, containing a great mass of valuable information, has been compiled and published in each province. Many years ago, under the directions of the Madras Government, Mr. Havell collected and published some very instructive notes on the many indigenous industries of that presidency. Within the current year the present writer has been commissioned by the Government of the United Provinces to conduct an industrial survey. A similar appointment has recently been made by the Central Provinces administration, and I believe the Government of Bengal is taking steps in the same direction.

Much misconception, however, exists in the popular mind regarding the scope and method of an industrial survey. According to some only the indigenous or hand-industries should come within the purview of such an inquiry. Others, again, would limit it entirely to art industries. A great many persons appear to be of the opinion that the Government should publish a list of articles manufactured in each town and district with the names of the manufacturers or their agents, so that it might be easy for dealers or ardent Swadeshists to ascertain whence their needs could be met. Another class of persons desire that the technical processes of the various industries should be carefully studied and described for the benefit of those who desire to start such

business themselves. It is hardly necessary to point out that it is beyond the capacity of any individual to conduct a survey of the kind last indicated. The industrial monographs referred to above partly meet the want. It has, however, to be borne in mind that in all progressive industries the processes are constantly undergoing change, and where they are stationary, the industry is either in a stagnant or in a declining condition. A monograph published to-day will not be of very much use ten years hence. Nor is it a legitimate function of the State to publish a trade directory of the sort asked for by many people. Directories already exist for all industries conducted on European lines, and it ought to be possible for private enterprise to supply the need regarding indigenous industries, art or otherwise. Such a directory will have to be published every year or at very frequent intervals. It may also be observed that a Government publication may do serious injury to interested parties by the omission or inclusion of particular names.

We are thus confronted with the question, what should be the aim of an industrial survey? To my mind its ultimate object ought to be to indicate the economic possibilities of the province. Briefly, we should study the resources of the province in soil and raw products, labour both skilled and unskilled, capital, communications and facilities for trade. We have then to ascertain the wants of the people in the shape of finished articles, or, in economic language, the demand that exists among consumers. The surveyor has then to endeavour to find out whether the demand is or can be locally met, and also to suggest what would be the best method of utilising the surplus raw products of the province.

I may be permitted to go a little more into detail. In studying the industrial condition of a tract it is imperative to take stock first of all of the raw products, both actual and potential. Such products may be either mineral or agricultural. Thus in the plains of the United Provinces we find there is neither coal nor any metal, such as iron, tin or manganese. We may therefore, at the very outset, neglect the feasibility of organising industries like the iron works initiated by the illustrious Mr. Tata. On the other hand, it will appear that there is lime in many places, and there are exten-

sive tracts producing the saline efflorescence known as *reh* as well as *sajji* (a crude carbonate of soda largely mixed with sulphate of soda). The question at once presents itself why caustic soda is not manufactured out of these products. Again for cotton, a dry, well drained soil is usually considered necessary. Very little cotton is grown in Eastern Bengal, and one studying the industrial possibilities of that province would be wise to exclude from immediate consideration the desirability of organising on any large scale the industry of cotton spinning. His time will be for the present fully taken up with the solution of the problem why the jute grown at home cannot be locally converted into fabrics instead of being exported to Calcutta, Dundee and New York. Again, the forests in the mountainous regions of the United Provinces have large tracts of pine-trees. In an industrial survey the point will arise whether any industrial use can be made of these trees, for instance in the manufacture of turpentine, or as wood for matches.

The next point to bear in mind is the labour supply. In many industries it is the most serious difficulty of all. Attempts have been made in various parts of India to manufacture glass according to modern methods. Most of these attempts have ended in failure. In some cases the want of success is partly attributable to an injudicious location of the industry at a site where raw materials were not available except at prohibitive prices. In all instances of failure, however, the chief cause of disaster has been the want of skilled labour, both superior and inferior. Nor is the question of unskilled labour unimportant. Perhaps the best site for a wood-pulp factory in the United Provinces would be in Jaunsar Bawar, in the hilly part of the Dehra Dun district, where spruce and silver fir trees are found in abundance, and water power will also probably be available. Intending capitalists will, however, have to consider very carefully the question of labour supply, for the tract is very sparsely populated.

The question of capital can never be neglected in an industrial survey of any part of the country. Each industry will have to be considered in detail, and a careful study will have to be made whether production on a large scale is

necessary or mere hand-power will suffice. For hand industries the great difficulty of the industrial or cottage worker is that he lives from hand to mouth, and has not enough capital either to buy his raw materials or to be able to stock a sufficiently large quantity or variety of goods to take full advantage of the selling market. He is, therefore, altogether in the grip of the money-lender. I have no desire to disparage the function of the money-lender in the economic organisation of a country, but where you have to compete with foreign goods produced on an enormous scale, the interest on capital being merged in profits, it will be difficult to hold your own with the present system. A very large extension of the co-operative movement is necessary among the industrial population of this country, and my humble opinion is that there are greater possibilities in industrial co-operation than even in agricultural co-operation.

The question of co-operation is also intimately associated with the organisation of trade in other respects. Many of our smaller industries are at present languishing for want of adoption of modern methods of advertising and marketing. There is no agency whatever for placing the producer in touch with the consumer. Tastes are continuously varying among consumers. Our craftsmen suddenly find that a particular stuff that had a great sale is a glut in the market. There is no one to tell them what is the style of goods which is now in demand, and what articles the craftsmen should produce to suit the altered conditions of the trade. In an industrial survey an attempt should be made to determine if any such agencies can be established for the different industries. I need hardly say that in a matter like this a very great deal can be effected by a non-official organisation like the present Conference and smaller societies affiliated to it.

Facilities of communication cannot also be excluded from the purview of an industrial survey. For every industry you must see that all the raw materials are easily procurable, and that the finished commodities can be economically transported to the market where the best prices are obtainable. Thus, to take the example of a match factory again, the ideal location will be in the heart of the forest where the raw wood is most abundant. You have, however, to

think of the cost of carriage, not only of the machinery and chemicals that will be necessary (coal may be neglected, as wood fuel will probably be available) but of the finished matches to the large entrepôts. One of the most interesting and difficult questions that have cropped up in connection with my inquiries in the United Provinces is that relating to railway freights. Many of the existing industries complain that it is hopeless for them to find a market for their produce in the large towns on the seaboard because railway freight, even at the lowest rates over long distances in the country, is higher than sea freight from competing countries like Japan and Germany.

So far I have dealt with the problem from the point of view of production. Reference, however, must be made to the question of consumption. I think in the present stage of our industrial development it may be taken as an axiom that our first endeavour should be to manufacture for the home market. A full discussion of this point will involve references to cost of carriage from one country to another, protective tariffs and other matters that are not immediately relevant.

A glance at the trade returns of India will convince any one that there is a considerable leeway to make up in the home market before thinking of foreign markets. We should therefore carefully analyse the traffic returns of the province and observe what articles at present imported from outside could be manufactured with raw materials obtainable locally. About fifteen years ago the importation of cigarettes into India was limited to high grade and expensive tobacco. When the Government of the United Provinces decided to abolish the tobacco farm at Ghazipur, it was because locally grown tobacco was not suitable for the manufacture of superior cigars and cigarettes. As every one knows, there is now a very large consumption in the country of very cheap and inferior cigarettes. As a result of an industrial survey, inquiries will have to be made whether the tobacco grown in different parts of India can be utilised for the manufacture of this style of cigarettes. Again, large imports take place every year of varnish for various purposes. The materials for the manufacture of varnish

exist in the country in the form of lac and mahwa (*Brassia latifolia*) flowers as a base for the distillation of industrial alcohol. The industrial survey we contemplate will raise the question whether varnish cannot be economically manufactured in the country.

It will be found after a consideration of the traffic returns that many of the raw products of the province cannot be sufficiently utilised to meet the demand of local consumers. The United Provinces in a normal year produce more wheat than the people of the province care to consume. Some of the wheat is exported to Calcutta and Rangoon and is there milled into flour. It should be one of the points for study in an industrial survey what are the obstacles to the milling of the flour locally and its export—the industry of milling will not only employ local labour but retain for local consumption the chaff—a valuable cattle food. Similarly, enormous exports have been taking place in recent years from the cotton districts of India of cotton seed to Europe. There the seed is crushed, the cake is utilized as cattle food or manure, and the oil is consumed for soap as well as edible purposes. In an industrial survey, the question of the export of cotton seed will naturally be discussed, and it will be for agricultural and industrial experts to decide whether, if cotton seed be crushed locally, a home market cannot be found for cake or oil, or both, otherwise whether it will not be more economical to employ local labour and export the cake and oil instead of the raw seed.

I have now indicated briefly what may be considered to be the scope of an industrial survey of any part of this country. It will be seen that the work cannot be accomplished in a hurry, nor without the co-operation or collaboration of a large number of people. Whoever is entrusted with the compilation of the central data will have to delve deep in the large mass of Government publications, like census reports, provincial and imperial trade and traffic statistics, district gazetteers, industrial monographs, scientific publications, like agricultural ledgers and bulletins, reports of the scientific departments, and last, though not least, the monumental *Dictionary of Economic Products* of Sir George

Watt. He will need to make a close study of the principal markets and trade centres of the province, and he should have a knowledge of the smaller marts as well. He will have to spend many days in the industrial centres, both for the large and the small industries. He must be in touch with the capitalist as well as the labourer, and able to appreciate the difficulties of both. In the end he can make mere tentative suggestions which actual business men only can test and accept or reject. In such an undertaking he needs and merits the help and assistance of all interested in the industrial welfare of the country.

TECHNICAL EDUCATION FOR THE WORKMAN.

By JOHN WALLACE, Esq., C.E.,

Editor, the "Indian Textile Journal," Bombay.

How shall we estimate the progress of Technical Education as imparted in our schools during the past 20 years, and where shall we seek for the proof of it? One naturally looks among the familiar craftsmen, the carpenters, joiners, masons, smiths, painters, glaziers, plumbers, tinsmiths and decorators, expecting to find improved methods of work, greater accuracy and expedition, and better choice of materials. But such is not the case. Native workmen, working under Native control, are, generally speaking, as bad as ever. It is only necessary to visit some of the largest houses in course of construction in the best parts of Bombay to find workmanship of the lowest class. In one large house, facing the Elphinstone College, all the joinery is finished with the jack plane, many of the joints in shutter frames would admit a half anna coin, the jhilmils rattle loose, and the locally made hinges are all deficient in wearing surface. Many of the hinges are not in line. The work of the plumbers and electric fitters is exceedingly rough, although their material appears good; the painters seem quite incapable of mixing the same shade continually, and the national lack of standard of excellence is just as obtrusive now as before. An Indian cannot paint a window frame without painting the glass, and if obliged to clean the glass, he will use sandpaper or emery cloth, which ruins the surface. He will varnish a dog-cart with his fingers dipped in varnish, or

paint doors with a piece of rag, instead of using a brush, leaving clots of paint in the corners. If he paints or colour-washes a wall, he leaves the floor all foul with droppings, and he rarely does any repair work without damaging, in some way, the building in which he works. The Indian mason continues to build walls with stones of a pyramidal shape, the base forming the exterior surface, a most vicious practice, and the cabinet maker has so little confidence in his own jointing that he ties the legs of tables together to keep them from coming loose. Slovenliness and imperfect knowledge of his craft are the characteristic of his work, and his outfit of tools is that of a man who will buy or make nothing that he can possibly do without, and who has no regard for time as an element of cost. If tools are provided for him he will wear them out in half the time a European would take, and the wear is generally that of abuse or neglect. I found in Dhulia, Khandesh, a very clever wood-worker engaged in joinery and cabinet-making. He had made several labour-saving machines, including circular and fret saws. Among his products were kindergarten school sets of models, which he shortly afterwards abandoned, as they did not offer him a sufficient profit, although labour and wood were both cheap. The explanation of his failure lay in the faulty construction of his tools. There was no real accuracy in them. A well adjusted circular saw, properly sharpened, will cut hundreds of cubes so accurately that they do not need planing at all ; a slight application of fine sandpaper is all they need, and even that may be dispensed with if the saw is sharpened in a certain manner. The Dhulia joiner might, to-day, have a steady business in kindergarten models if he had the benefit of instruction from a qualified teacher of handicraft, and it is a reproach to the wood workers of India that any articles of wood, used for drawing or for kindergarten instruction should continue to be imported from Europe. The potter for many centuries has continued to make unglazed cooking pots, while the potters in Southern Europe, with appliances almost as simple as those of this country, are producing glazed goods that are preferred to any other material for cooking pots.

The Indian artificer has no standards of good workmanship ; he will give the smallest possible return for his pay, and

when taxed with scamping or fraud, he will display considerable ingenuity in refuting the charge, and endeavouring to prove that his work is as good as and possibly better than was ordered. It is not etiquette to admit a blunder—and the occasion offers an opportunity for talking. Setting aside his fertility in excuses, the Indian workman is almost devoid of originality ; but it is to be hoped that this waste energy may, some day, be converted into useful force ; it offers an interesting problem to the educationist.

All well-wishers of India desire to see a better use made of the raw products that are exported at present in such quantities. Materials to produce paints, varnishes, leather, canvas, cordage, textiles, drugs, oils and metals, many of which return in a manufactured state, might all be dealt with here if workmen were more reliable. It is they who determine the final quality and finish of any manufacture, and if they are stupid, careless, irregular, migratory and improvident, no talent of master or manager can avert the deterioration of the product. We must, therefore, give such attention to the education of the workman as shall improve his working capacity.

Meanwhile large sums are annually spent on Technical instruction. I do not imply that good workmen are not increasing in India, for that would not be true. Good workmen are being trained in railway, dockyard, and other engineering workshops under European control throughout India ; but what I do contend is that the influence of schools where handicraft is taught, pure or mixed with science and literature, has not yet reached the rank and file of workmen, even in the towns where the instruction is given.

It cannot be said that the Indian is averse to things that are foreign. His consumption of kerosene, wire nails, corrugated sheet iron, cheap padlocks and cutlery is enormous, and he has taken kindly, indeed, far too kindly, to literary education until the market is glutted and the pay for clerical work does not provide a decent living. Meanwhile the earnings of a good craftsman may easily be double those of the clerk. Why, then, should the ordinary workman be so indifferent about technical education ? He will not go to a night school, and he has but scant appreciation for the instruction his son may get at an industrial or an art school,

indeed, the knowledge of drawing that the boy acquires is the only part of the training that is appreciated by a future employer and by the workman himself.

The schools, sometimes called technical and sometimes industrial, according to the fancy of the promoters, and where the prospective workman gets his training, are in charge of men who have not been taught to teach. Some are selected workmen who have exercised their trade for some years; others are young men fresh from some technical institution, who have a very superficial knowledge of handicraft, and have no experience of trade methods and workshops. They generally attach more importance to scientific than to technical knowledge, and this accounts chiefly for their failure as teachers, while the pure workman teacher simply continues the habits of his craft without any thought of improvement. He jealously conceals what he considers to be his trade secrets for fear any boy should become clever enough to supersede him. These secrets generally turn out to be things that are common knowledge in other countries.

One of the rarest things in India is to hear a definition of technical work. It is generally assumed to consist of a mixture, in no fixed proportion, of science and art; the science being mathematical, mechanical and chemical, and the technique the art of some kind of work in wood and metals. My earliest recollection of King's College, London, is the memory of a definition of physical science given by one of the masters. He said it was a form of knowledge that could be conveyed in writing, and that could be tested experimentally, giving the same results from similar premisses. Technique is a word that has been appropriated principally by the exponents of the fine arts, and is used with reference to the work of sculptors, poets, painters, writers, and actors, and in every case it means the distinctive finish of the work, the result of their method and talent, and although it forms the chief object of criticism, it cannot be acquired by any amount of reading, and is thus completely distinct from science. Technique is the strict equivalent of art and craft, it is the same thing expressed in words of Greek, Latin and Saxon origin, and although nearly related to science the idea is quite distinct. For example, one may read all that can be written about hammering a nail, hand-

ling a saw, wheeling a barrow, riding a horse, or swimming, without acquiring any one of these arts, but the most illiterate man may become expert in them all by a sufficient amount of practice. A technical school is literally one where science is not taught ; a school where science and craft are mixed is a tradeschool ; and to organise a trade school properly the most important directing influence should be that of men having an intimate local knowledge of the trades intended to be taught.

The confusion of the terms technical and scientific is exemplified in two institutions in the Bombay Presidency. In the College of Science, Poona, various physical sciences are taught, and illustrated by means of work in wood and metals for the training of engineers of roads, bridges and canals. In the Victoria Jubilee Technical Institute, Bombay, various physical sciences are taught, and illustrated by means of work in wood and metals, for the training of students in mechanical or electrical engineering and textile work. It is not easy to guess on what basis the titles of the two institutions were chosen, but they illustrate the popular acceptance of the terms Science and Technique. In Manchester at the present time a project is being discussed for the establishment of a Technical Library. A Library of applied Science is probably what is meant.

The cause of the present state of Technical Education in India is traceable to the constitution of the Educational Department, which is controlled by University men, whose ideas of education are so built upon reading and writing as a foundation, that they have overlooked the true relation of technique to science in a country whose industrial training is still in a very backward condition. In every other country which has reached any industrial eminence, the knowledge of handicraft preceded, by many generations, that of reading and writing. Even in Japan, which is so often referred to as an example for India, reading and writing only became common property about 50 years ago, and even at that time the Japanese craftsmen were a century ahead of the Indian workman to-day.

Of the leading countries in Europe the same story may be told. Craft reached a high development before literacy was needed, and yet, in spite of all past experience, the Indian Government, through its Educational Department, has attemp-

ted to improve the technique of the people through literary channels. It was expected that the young men coming out of the scientific and technical schools would become teachers among the men they would ultimately control, but this did not happen. The scientific training the students received generally increased the mental distance between supervisor and workman. The students had not been taught to teach. In the meantime, and quite unofficially, real technical education had been introduced, and was being successfully imparted to the native workmen in the railway and other workshops under European supervision, and the training, being limited to the work the men were paid for, was a success from the beginning. The foremen were not trained teachers, but they knew the work, and were responsible for its execution, so the men increased in wage value and learned orderly habits. Success was inevitable, for the teacher knew exactly what was wanted and taught nothing else. This was a good beginning, but it must be improved upon, a subject to which I shall presently come.

When lay assistance was required for the management of trade schools the Educational Department was not fortunate, for the persons chosen to control these schools are chiefly remarkable for their lack of technical knowledge. Lawyers, doctors, civil servants, merchants, are appointed; they carry out the business of the school, and look after the finances, but the important matters of technical instruction are left with the masters who are frequently very ill-prepared for their duties. If they have been brought from Europe they naturally want to carry on the work as they have done in their own country, regardless of the enormous differences that exist between the foreign and the Indian student and between the actual industrial requirements of the two countries. In such matters the committee or board should be able to furnish the necessary guidance and control, directing the teacher's efforts to the most immediate need of the crafts represented in the school. The ordinary committee man, who can only regard Technical education from a scientific or literary point of view, cannot understand that a sound training in handicraft may be given to a man who cannot read and write. No man can safely meddle with Technical education in India who does not know

practically the details of at least one trade as exercised both in India and in Europe, in order that the defects in Indian methods may be corrected. This intimate knowledge is necessary, because an inexperienced committee man is liable either to overlook defects in technique, or to propose reforms that are premature or unsuitable. Is it any wonder if the men who know refuse to sit in committee with the men who do not know ? There is also observable among inexperienced men a deplorable disposition to multiply subjects of instruction without any assurance that a competent teacher is available. This has been disastrous in several instances. Lack of knowledge of technical matters is especially noticeable in the speeches of prominent men, delivered on public occasions, such as the opening of a new school or the distribution of prizes. They will talk of the advantages of scientific knowledge, the increase of wealth due to technical training, the utilisation in the country of raw products, and sometimes even of the dignity of labour. But of real technical matters not a word. And the audience departs not only no wiser, but with a false idea of the subject. The very worst friend of Technical education is he who collects the programmes of the most advanced scientific educational institution in Europe and America, and presents them, in his best literary style, as models to be followed in India. He would repeat, if he were allowed, the errors of the so-called higher education, some of whose results are in such unpleasant evidence to-day.

Technical education has no necessary connection with elaborate buildings containing marble slabs on which the name and virtues of the founder are conspicuously inscribed. Any shed that is of sufficient size and is properly lighted, ventilated, floored and drained is good enough for the purpose. So many schools and so many teachers are required that anything but the simplest of buildings would savour of extravagance.

An educational programme for India should have a very definite object, especially if the subject be technical. The object is to improve the efficiency of the native craftsman so that he may turn out more and better work and get a better return for his labour. To carry out the programme, it will be necessary to know very clearly what are the defects of the

workman, what is the knowledge that he most needs, and how much of this most necessary knowledge can be imparted to him and assimilated during the time available for his instruction. We seem already to have drifted a long way from the imposing studies of the scientific universities of other countries, but we are getting nearer the mark. In instructing the Indian workman it is also well to remember that he can only take in a limited amount of new knowledge per generation; there is therefore all the more need to discriminate in the choice of subjects.

The success of technical instruction in railway workshops suggests an extension of the system by which the foreman might receive a special course of instruction that would improve him as a foreman, or qualify him to be a teacher in a primary technical school. The carpenter may be taken as a familiar example. He might be selected between the ages of twenty and twenty-five after having given proofs of his intelligence and ability as a workman and, as the chief defects of the native workman are carelessness as to measurements and neglect of his tools, the pupil would be instructed in cutting edges with tests as to their working value, the sharpening and use of various saws, the construction of labour-saving devices of wood, simple calculations of quantities and hand sketches with dimensions as working drawings. An important part of his training would be the art of demonstrating with the aid of the blackboard various familiar processes in carpentry. For example, he might represent a jack plane, a saw, a centre bit, or even a paring chisel, and describe its construction and the reasons for the shape of each part in such simple language as would be familiar to men of his class. There are reasons for every movement in handicraft, but Indian foremen are rarely able to tell them. A simple course of plain geometry, conveyed as much as possible by means of the plumb level and tape measure and applied to the school building, would complete the course, which could be mastered in from 6 to 8 months. These men should be able to read and write, but they should be able to teach without the aid of books, because most of their pupils will be illiterate.

As the quality of any manufactured article depends on the ability and discipline of the workmen, who are generally

illiterate, and who have rarely served any serious apprenticeship, the training of foremen is a matter of great importance. These men would have to be maintained during their period of training ; and I have reason to believe that, among the Native Chiefs and the wealthy Indian employers, sufficient funds could be raised for the fees of the normal training school and the support of the pupils they would send. The course of training just indicated may seem meagre to a man of European experience ; but, compared with the mental equipment of the average native maistry, it represents a considerable step on the road to efficiency, and it is probably quite long enough to start with. It has, moreover, this recommendation, that while it improves his efficiency in his own line, it does not tempt him out of his proper groove towards clerical employment. There is, however, one serious difficulty in the way of this project. There is, so far as I know, no normal training school in India for instruction in handicraft. Attention has been principally directed to the training of masters. This may probably account for my experience in the many technical and industrial schools I have visited. I did not find one saw in good condition ; the grindstones, with one exception, were all in very bad order, and I did not find any of the wooden screw vices of the pattern that are still common in England, and are especially suited for Indian workmen on account of their cheapness. What kind of training can the teachers have had to allow the tools to get into such a state, and what is the value of the inspector who tolerates such slovenly teaching ?

The subject of technical instruction cannot be left without reference to the primary training of children of the labouring classes. What should they learn ?

If we may rely on the evidence of Mr. Nesfield, Director of Public Instruction in the North-West Provinces, the three R's were not of much use. He found that primary education made the children of cultivators less contented with their lot in life, less willing to work and more litigious. He persuaded 1,037 old pupils who had left school for some time to present themselves for examination and of these, 16 per cent. passed in one or more simple subjects (reading, writing and arithmetic) and in one or other of the three more difficult grades, while the remaining 84 per cent. failed to pass in any one

subject. The instruction given them appears to have been of no use in their daily work, and they forgot their schooling as people forget the things they do not practise. Education did not make them better agriculturists because their instruction did not include anything directly bearing on agriculture. It was also made clear that the short receptive period of the lives of these youths had been sacrificed to a system borrowed from another and totally different country. The incident took place 24 years ago and, although object-lessons have since been introduced, rendering the tuition more interesting, reading and writing continue to be taught to and forgotten by the bulk of the pupils. The teaching of five boys to read, in order that one might remember the art, indicates very peculiar ideas on the subject of education.

The primary trade school can only be opened after teachers of handicraft have been trained in a special class and, taking wood working by way of example, they should be able to teach the following subjects :—Freehand drawing and arithmetic as applied to the carpenter's craft.

The use of the foot rule in correct measurement.

The reading of the clock.

The use of the mallet and chisel as an introduction to the study of cutting edges.

The use of the saw for exact work, *i e.*, cutting out a pencil line on both sides of a piece of wood. This is soon acquired when the saw is in good adjustment. The exercises should include working with the saw in the usual state, comparing the time occupied in doing the same amount of work with each saw. As the saw is the most neglected tool in the kit of an Indian workman, special care should be given to this subject. The pupil would finally learn to sharpen and set the teeth of saws.

The systematic grinding and whetting of cutting tools would follow with a comparison of the time used at the grindstone and at the flat stone (*lisano*) generally used. Edges sharp and dull would be examined by a watchmaker's lens, and comparative working tests would be made of sharp and dull tools.

Tests of the strength of wood. These are made with various samples of wood of similar size, resting on supports

and loaded in the middle with a bag filled with stones, until they break. Instruction should at the same time be given on the qualities of the samples tested.

The holding power of nails and screws. The lesson is taught with the aid of a nail-puller and a bag of stones, the wood being held in a vice. Experiments are made with bright and rusty nails and with screws. Screws, as driven in India, have often less holding power than nails. In this lesson the shape of the point of a screw driver is explained.

The correct use of planes and their adjustments. This work is taught partly by demonstration at the blackboard and partly by graduated exercises.

The fitting of handles to hammers and chisels. If one may judge by ordinary examples, this subject calls for definite instruction of a simple kind.

Every school should possess examples of wood working machines, made principally of wood, to shew how much a carpenter may do for himself in making machines of precision. I have for many years used a lathe, made principally of wood, in which sawing, screw cutting and dovetailing is done besides all the usual work.

A short course of applied geometry will be required in which it will not be necessary to talk of Euclid or the Law of Gravity. The making and testing of a wooden square, a straight edge and a plumb-level, the fixing of hinges three in line (as on a door) and exercise with the square, plumb-level and tape measure upon the walls, doors and windows of the workshop, properly explained, should form an introduction to the carpenter's art and a safeguard against many vague or erroneous notions which beset the ordinary worker in wood. This instruction should also render him more observant of any further useful knowledge that might come in his way; it would not be likely to run to waste, for it would all be required by the future workman.

The most successful exponent of technical instruction that I know in India is Mr. Alfred Chatterton, Director of Industrial and Technical Inquiries, Madras. When he introduced the manufacture of aluminium into India, he made no conditions of literary accomplishment in his technical school. He took in such workmen as wished to learn, devised tools of

the cheapest and roughest appearance, but which were effective, and afforded the workers every encouragement and assistance when they left, to work on their own account. The success of this aluminium industry needs no further detail. His weaving school is on an equally non-literate basis, and his latest enterprise in boring for water by means of which he has discovered enormous supplies, exceeding in many places the needs of the farmers, will be a standing memorial to his intelligent appreciation of the practical needs of the people. It is impossible at the present time to estimate the benefit he has conferred on the district—not by finding out how to bore for water, but by prevailing on a very conservative people to adopt the system and to purchase oil engines and pumps to lift the water.

- India has yet to recover from an educational impulse in the wrong direction. Reading and writing, which have been of incalculable value to certain classes, are not of use to all, and they become positively pernicious when they entice young men away from a sure living by handicraft to the overcrowded ranks of clerical labour.

A time will come when literary knowledge will be necessary to the whole population of India, but that is the affair of posterity.

I have endeavoured in the foregoing remarks to prove that no suitable education has been provided for the large class of workmen on whose competence the quality of India's products principally depends, and that many of the attempts that have been made to improve the craftsman have defeated their own ends by teaching the wrong subject and attempting too much. Employers of labour in India, who know the work they command, can all tell how very little special knowledge would be required to increase to a considerable degree the wage value of their men, and how a logical habit of thought, which can be acquired at a very early age, would enable them to continue their education, by habits of observing, throughout a lifetime. Education for the masses has been tried for many years, with singular ill-success if we may judge by results, and it is certainly not because the pupil cannot learn. A new class of teachers is required, with special training, to meet the real needs of the working community, and

no man should be allowed to undertake class work who cannot furnish proofs of his ability to teach. An incompetent teacher of craft, however clever he may be as a workman, will simply help to perpetuate the faulty methods, the bane of India's industries, which it is the chief object of technical education to remove.

COMMERCIAL EDUCATION.

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Twenty-five years ago there used to be sharp differences of opinion as to what Technical Education meant and included. There was a vagueness—an indefiniteness in our ideas about the scope of Technical Education. For some time, every kind of education other than literary and professional education was considered to be Technical Education. Later on, the view began to prevail that Technical Education is neither more nor less than Industrial Education. Our ideas on the subject, thanks partly to the annual Industrial Exhibitions and Conferences, have now become much clearer, and it is now pretty generally recognized that Technical Education embraces three main heads, *viz.*, Agricultural, Industrial and Commercial Education.

Agricultural Education is concerned with the production of the raw materials of commerce. Industrial Education is concerned with the conversion of raw materials into manufactured products, while Commercial Education is concerned with seeking out markets for commodities and finding purchasers for the products of Agriculture and Industry. Though it has not been easy to ascertain the best means of imparting Industrial Education, we have always readily acknowledged the importance and utility of Industrial Education. It has not, however, been always so easy to get the public to recognize the importance of Commercial Education. Markets for commodities are as great a necessity for the producer as fields of production are a necessity for the continued existence of a market. The manufacturer's

occupation will be gone the moment he ceases to be a merchant or to co-operate with a merchant.

The inter-dependence of commerce and industry is so real and obvious that it is difficult to realise why, in the past and to some extent even now, Commercial Education has not been recognized to be an important portion of Technical Education. It is readily admitted that preliminary training is necessary for a young man who desires to become a mechanical or electrical engineer, a manufacturer of glass or pottery, a spinner or a weaver, while it is often thought that buying and selling are sufficiently simple operations in which any young man born of a wealthy father may readily engage himself without previous training of any kind.

In the words of Sir William Preece, "the Americans and the Germans are ousting the British out of their markets not so much by any superiority in the quality of their goods, but by their superior knowledge of the demands of the markets, by better direct communication with foreign countries, by superior methods and business ways, by establishing regular intelligence departments, and above all by possessing and exercising superior commercial knowledge." If Europe and America with their accumulated prestige and experience consider it necessary to make commerce a subject of serious study, if such leading commercial countries as England and America, Japan and Germany, consider higher Commercial Education necessary for the advancement of their commerce, how much more essential must it be to organize Commercial Colleges in this vast continent of India, so bountifully endowed by Nature and so little exploited by us. We are so thankful to the Almighty for having made our country so rich in natural resources that we do not care to teach our young men what India is capable of achieving in the world of Industry and Commerce.

On the recommendation of Lord Ripon's Education Commission, a resolution was passed by the Government of India in October 1884, "that every variety of study should be encouraged which may serve to direct the attention of native youths to industrial and commercial pursuits." The Royal Commission on the Depression of Trade in England recommended "a sounder commercial training as the chief

remedy." This recommendation of the Government of India was first acted upon by the Trustees of Pachaiyappa's College, Madras, who, at the instance of Mr. John Adam, M.A., Principal of that College, started a Commercial School in Madras and placed it in my charge. We were able to secure the sympathy and support of the leading merchants of Madras and of the Madras Government. It was, however, thought by our sympathisers and supporters that the only useful work which could be done by a Commercial School was to teach its students to write a neat hand, to fill in blanks in printed forms of mercantile letters, and to make the simpler arithmetical calculations with rapidity and accuracy—in a word—to perform the duties of a Junior Mercantile Clerk. In the course of five or six years the Commercial Schools of Madras were able to convince the public that they could teach their students much more than this and that they could turn out young men qualified for performing the duties of Senior Clerks in the Correspondence and Accounts Departments of Mercantile Houses. The Commercial Schools of Madras and Bombay have already proved their ability to turn out book-keepers and accountants, shorthand writers and reporters, banking, shipping and insurance clerks, qualified to enter upon their duties without previous apprenticeship. The utility of the schools engaged in imparting Elementary and Secondary Commercial Education is now so largely acknowledged on all hands that the permanency of such institutions may now be considered to be well assured.

But Commercial Education will not deserve the attention which is claimed for it, if commercial institutions are merely intended to divert young men from one kind of quill driving to another kind of quill driving. The advocates of Commercial Education have always had a much higher object in view than inducing a few young men to accept clerkships in mercantile offices. The real and chief object of Commercial Education is to enable our youths to become traders, merchants and bankers. The training imparted ought to attract the brightest of our youths and enable them to take a comprehensive view of the markets of the world, to seek out the cheapest sources of supply and

the best markets for such commodities, and to ascertain and utilise the best means of transport for the commodities in which they deal. They should be enabled to read and understand statistics, to appreciate and fully grasp the significance of all changes in the money market, to take full advantage of the facilities granted by bankers to merchants, to promote the formation of joint stock companies, and to conduct the administration of such companies.

The most pressing problem in connection with Commercial Education that now demands our serious attention, is the right method of imparting higher Commercial Education for the purpose of turning out merchants, bankers, and financiers. What is the nature of the training to be imparted? By whom should our commercial colleges be financed and managed? By whom should our commercial examinations be conducted? How can we effectively attract students of the right class to these Commercial Colleges?

However well organized and well conducted a college may be, the usefulness of that college will be greatly reduced unless the college is able to attract students who by their previous education are qualified to benefit by the business training imparted in that college. We have for the past half a century been so much accustomed to associate higher education with a university degree that it is so difficult to prevail upon our young men or even their guardians to believe that a college which does not prepare its students for a university degree deserves to attract the brightest of our young men. The impression unfortunately prevails that commercial schools and colleges are intended only for the benefit of such students as have not the intellectual capacity for a university course. Though it is quite easy to prove that such an opinion is based upon a misapprehension of facts, it will be unwise to ignore this prejudice against colleges unconnected with a university. The practical administrator ought to take note of this prejudice and frame his programme for the development of higher Commercial Education so as to attract the brightest of our young men as well as the sons of well-to-do parents. This one reason is enough to induce us to press the Indian universities to institute degrees in Commerce and affiliate

commercial colleges that agree to prepare candidates for University Degrees in Commerce.

Another reason why our universities should provide for higher Commercial Education what they have done for legal, medical, and engineering education is, that the training imparted in a commercial college unconnected with a university will, in endeavouring to make its instruction practical, pay insufficient attention to the training of the intellect and to mental culture. Such a college will pay more attention to business routine and to the practical requirements of a business office than to the consideration of the larger problems of production, distribution, transport, and finance. Such colleges will succeed in producing capable head clerks and even managers, but will not enable our young men to grasp the marvellous and complicated phenomena of modern commerce and to generalise from complicated facts in the concrete life of commercial communities. A substantial portion of the course now prescribed by our universities for the degree of Bachelor of Arts is absolutely essential for the young aspirant to a Degree in Commerce. This is especially true in the case of languages, History, and Political Economy. Without such intellectual training and without such culture, the graduate of a commercial college would be unable to apply his knowledge to the ever-changing problems of commerce that would await solution at every turn.

It is sometimes argued by university authorities that our universities ought to have nothing to do with bread-winning pursuits like commerce. University senators often pat Commercial Education on the back, express the profoundest sympathy for it, and declare that it ought to be encouraged by every possible means. But when it comes to a question of instituting university examinations in commerce, they shrug their shoulders and fight shy of university degrees in Commerce. It is not the business of a university, they say, to enable a man to earn his bread. Mental culture is, I admit, one of the fundamental objects of education. But to plead that university training ought not to be calculated to enable graduates to earn their livelihood, is to ignore the past history of universities, Indian and foreign. Are not the

Legal, Medical and Engineering professions bread-winning pursuits, and do our young men take degrees in Law, Medicine and Engineering merely to pay their homage to the goddess of learning? And do they, when they begin to practise their profession, charge no fees for their services? Or, when they do charge fees, do they charge just enough to keep their body and soul together? The fact is, to quote an eminent writer, "the philosophy that affects to teach us a contempt of money does not run very deep. So manifold are the bearings of money upon the lives and character of mankind that an insight which should search out the life of a man in his pecuniary relations would penetrate into almost every cranny of his nature. A right measure and manner of getting, saving, spending, giving, taking, lending, borrowing, and bequeathing would almost argue a perfect man."

Another objection which has sometimes been raised to the institution of a university degree in Commerce is that the study of commerce will have a narrowing influence on the minds of university students and will not tend to produce that mental culture which ought to characterise every course of university studies. But an honest and careful scrutiny of the course of studies recommended for a degree in commerce ought to dispel this illusion and ought to convince even the most advanced advocate of university culture that the studies required for a degree in Commerce will discipline the intellect as much as the course for the degree in Arts. It is because we consider general culture to be essential for the successful man of business that we plead for university recognition of the study of Commerce. In the words of Sir Phillip Magnus, "the function of a university is to liberalise all kinds of professional studies, Medicine, Law, Engineering and Commerce, and to suggest courses of study leading to a university degree in the branches of knowledge cognate to different professional careers, and to encourage learning and original investigation in any of the subjects of study included in such courses. The love of knowledge for its own sake, which it is the highest aim of every teacher to stimulate, is not excited but rather deadened by divorcing science from its application; and it is in the quest of knowledge to serve some special end that the high-

est truths of science have often been revealed and the pleasure of research and discovery has received its supreme satisfaction.

That great historian of the American Commonwealth and of the Holy Roman Empire, the Right Honourable James Bryce, remarks : " I have felt for many years, and I have taken many occasions of urging that modern commerce whether it be regarded as an exchange of commodities, be studied from the side of production or the side of finance, has now become a subject which ought to receive full university recognition. It is a subject which is quite worthy of being treated in a philosophical and scientific way and of having a place in the curricula of our universities."

His Excellency Lord Northcote, in his capacity of Chancellor of the University of Bombay, urged that " commerce • should be as thoroughly taught and honoured a study as any other of those other branches of learning which an Indian university delights to honour and that the high literary reputation of the University of Bombay would in no way be diminished by increased recognition on its part of proficiency in scientific, agricultural, and commercial studies."

Whether the study of commerce deserves to be recognised by our universities is a question which has, during the past six years, been satisfactorily answered by the institution of degrees in Commerce by various British universities. Faculties of Commerce, with courses of studies leading to a Bachelor's degree and a Master's degree in Commerce, have recently been instituted in the universities of London, Birmingham and Manchester. Even the University of Cambridge has instituted a degree in Economics nearly on the same lines as the degrees in Commerce of the other universities. Our Indian senators can no longer plead that the study of Commerce does not promote mental culture and does not, therefore, deserve university recognition. It may, of course, be urged by unsympathetic friends that whatever is good for England cannot also be good for India. The fact is that, long before the institution of a degree in Commerce by a British university, we in India were pleading for the institution of degrees in Commerce by the Indian universities. Our proposals were then laughed to scorn on

the ground that we were endeavouring to copy the American universities in the matter, and that even England had not instituted university degrees in Commerce. Now that English universities have done so, we are sometimes told that we must wait sufficiently long to watch the result of the experiments being made by British universities in the matter. An argument of this kind, if allowed to prevail, would prevent, or greatly delay, the introduction of almost every kind of reform.

One other objection that may be raised against the institution of university degrees in Commerce is, that the training imparted in a commercial college under university control would be too theoretical, and might be so much divorced from practice that the graduates of such colleges would not become successful men of business. An objection of this kind deserves careful consideration, but is one which may be met by a careful organization and by a carefully drafted curriculum. The best plan seems to be that our commercial colleges ought to be under the management of our leading merchants and bankers, subject to university control. University control will ensure attention to mental culture and to general principles. The supervision of the merchants will ensure attention to the application of the general principles to the practical problems of commerce. The examinations will be so conducted as to test the ability of the candidates to apply their principles in practice. The questions set by the examiners ought to consist of practical problems in Commerce which can be solved with the principles that have been taught during the university course. The cooperation of the university authorities with the leading merchants will secure both the objects and will create a supply of university graduates in Commerce, with a sufficiently sound theoretical and practical knowledge.

All other kinds of objections having been met, a new kind of objection was recently raised by His Excellency Lord Lamington in his first Convocation speech as Chancellor of the University of Bombay. His Excellency remarked that "there seems to be a tendency to think that the establishment of a degree is all that is necessary for the complete equipment of any particular branch of higher edu-

cation. I have heard suggestions for a commercial degree. Now, no one disputes the importance of the aptitude for success in commercial life, but that a central university should be specialised to meet the requirements of the different professions that make up the activity of the commercial world, I believe, would be unwise until it has adequate resources to take up the work thoroughly. The need for such specialisation may be met, when those who are chiefly concerned make the demand, as the medical and the legal professions have done in the past." It was unfortunate that His Excellency was not correctly informed as to the nature and character of our demand for the institution of a degree in Commerce. We were not and could not have been so short-sighted as to think that the mere institution of a degree examination would be sufficient without the establishment of a well-conducted commercial college to prepare students for that degree. The fact is that I was prepared to announce large donations for conducting such a course as soon as the university authorities were prepared to receive favourably my proposals for the institution of degrees in Commerce. Again, it is against the past history of our universities to declare, as Lord Lamington did, that our universities should not recognise new branches of learning until they have adequate resources of their own to train students in that branch. Our colleges are now financed and managed either by private bodies or by Government, and our universities do not contribute towards the expenditure of any of our colleges. What the university has to do is to institute and conduct the examinations and to see that adequate provision is made in a private or Government college for the preparation of candidates for that degree. It is, however, gratifying to note His Excellency's admission that the need for such specialisation may be met when the demand is made by those concerned as in the case of the medical and the legal professions. I may be wrong, but I am not aware that our lawyers and doctors presented a petition to the university and to Government before our universities instituted university degrees in Law and Medicine. Nor am I aware that our colleges of Law and Medicine have been or are financed by our lawyers and doctors. Why

is it then necessary that our merchants should petition for degrees in Commerce and should offer to finance commercial colleges before the university thinks of instituting degrees in Commerce or Government thinks of starting and maintaining commercial colleges? However, commercial colleges would certainly gain in prestige and usefulness if our merchants took up the question in right earnest and cooperated with the University. Let us now make an authoritative demand for University recognition of the study of Commerce, and let us make an earnest endeavour to endow well-equipped commercial colleges in each province, and I am pretty confident that it will be difficult, even for unsympathetic friends, to raise any more objections.

The chances of success are much brighter than before if fresh attempts are now made in this direction. The re-constituted Senate of the Calcutta University actually passed a Resolution instituting a Faculty of Commerce, though this Resolution was finally dropped by the Committee appointed by the Government of India to frame regulations for that University. An amendment to this effect proposed by some of us in the Bombay Senate had secured the support of a large number of our colleagues in the Senate, but had to be dropped, for the time being; for certain other reasons. There was also an agitation in the Madras Senate for the institution of degrees in Commerce, which, however, proved abortive.

Let me now briefly indicate the scope and extent of university courses in Commerce. A sound knowledge of English and of at least one Asiatic and one modern European language will form an essential feature of the University course in Commerce. Among other subjects will be commercial mathematics and accountancy, mercantile law and practice, the history, science and practice of banking, currency, foreign exchanges, economics, economic geography, the history of commerce, industry and manufactures, the theory and practice of statistics, railway problems, transport, public finance, industrial development, and the organization of industries. The scope and extent of education that a young man would have received at college by the time he takes the Bachelor's degree in Commerce would be neither more nor less than the training

received by the Bachelor of Arts, the Bachelor of Science, the Bachelor of Laws, the Bachelor of Medicine, the Bachelor of Engineering or the Bachelor of Agriculture. The scientific study of Commerce is so vast and extended that there is ample scope for the institution of a Master's degree in Commerce, as there is in Arts, Law, Engineering, Medicine, and Science. As in the case of the other Faculties, a matriculate will take four years to qualify for the Bachelor's degree in Commerce and another two years for the Master's degree.

The next problem in connection with commercial education that demands our attention is an improvement in the organization of the commercial schools and colleges now in existence in different parts of India. Commercial schools have during the past three or four years been started in different parts of India without any attempt being made to profit by the experience of other provinces in working similar institutions. Different systems are in vogue in the different provinces of India, and in certain cases the plan that has been tried and given up in one province has been adopted in another province. In 1890 the Madras Government tried the experiment of attaching commercial classes to the Government Training College, but very soon gave up the attempt in favour of starting an independent Government School of Commerce. Though the requirements and opinions of local merchants ought to carry weight in settling the curriculum for these commercial schools, the authorities should freely avail themselves of the experience gained in other provinces in grouping and grading the subjects and courses of instruction. This has unfortunately not been done in every case; and the consequence is, that the mistakes committed in the earlier stages in one province, though they have subsequently been remedied, are now being repeated in other provinces. In Madras, Calcutta, and Lahore, the commercial examinations are conducted by Government with the cooperation of the merchants; these local examinations are more or less adapted to local requirements. In Bombay the mania is for London examinations and London certificates. Some of these London examinations, especially those of the London

Chamber of Commerce, are of a high standard. These London examination schemes are certainly not adapted to local requirements, though they are very good models for our framing an Indian scheme of examination for senior clerkships in firms. An Indian scheme of commercial examinations for senior clerkships, framed on English models but adapted to Indian requirements, is now a great desideratum. No specific general educational qualifications are now demanded from candidates for the commercial examinations held in India. The consequence is that the training imparted in these commercial schools very often degenerates into cramming and coaching. It is necessary to insist that every candidate for these commercial examinations must have completed his High School course. It is also necessary to provide for some kind of inspection by responsible authorities to ensure the adoption of right methods of teaching. In Bombay the demand for trained mercantile clerks is so large that a number of private commercial schools and classes have during the past five years come into existence and are in a flourishing condition without any kind of endowment and without any kind of help from Government. Bombay is the only province in India where it has not been necessary for the Government to spend money on commercial education. This is a feature of which Bombay may be proud. But freedom from pecuniary responsibility for the spread of commercial education makes it all the more incumbent upon the Bombay Government to frame a local scheme of examinations and exercise some supervision over the commercial schools and enforce right methods of teaching by withholding recognition from schools that do not come up to the mark.

Another problem that awaits solution is the formation of vernacular commercial schools for the benefit of those that discontinue their studies on passing through the vernacular or primary department. Nine years ago, when I was Head Master of the Government School of Commerce, Calicut, I organized a vernacular commercial class for the benefit of the sons and wards of petty traders in continuation of their vernacular course. This class is still being conducted by my old students and assistants in Malabar and has proved a

complete success. At the request of the Municipal Council of Sholapur, I have recently drafted a course of studies for a vernacular commercial school ; and my draft scheme is now under the consideration of the Sholapur Municipal Committee with a view to its being introduced into the Municipal Commercial School of Sholapur. The chief difficulty in this case as in the other cases is about securing a sufficient supply of qualified teachers.

Arrangements ought to be made for the establishment of a central commercial institution at the head-quarters of each province. This institution ought to have distinct departments for imparting higher, secondary, and vernacular commercial education. Provision must also be made in this central institution for training secondary and vernacular commercial teachers and supplying such teachers to the smaller schools in the mofussil. A well-equipped Technological Institute will cost at least 20 times as much as a well equipped Commercial College. Want of funds cannot, therefore, be so justifiably pleaded as an excuse for not organizing a system of commercial schools and colleges. It is the will and not the absence of funds that has been wanting. In spite of all these obstacles we may well congratulate ourselves that in the space of 22 years commercial education in India has made the progress which it has, and has made the Government of India go so far as to offer scholarships to young men desirous of qualifying for one of the British university degrees in Commerce. Another gratifying feature in the growth of commercial education in India is that throughout its history the initiative has always been from private individuals and managers of private schools and colleges. In Madras, after the managers of a private college had started a commercial school and proved it to be a success, Government took it up and started a school of their own in Malabar. In Bombay, again, it was reserved to the Trustees of another private collegé to start and conduct at their expense a college of commerce.

It is gratifying to note that the example set by these private institutions of Madras and Bombay has since been followed by the Governments of Bengal and the Punjab, who have, during the past three years, started commercial schools

of their own. An organized effort is now necessary to profit by each other's experience, to frame a comprehensive scheme, and improve the organization of the existing schools.

HIGHER COMMERCIAL EDUCATION.

By C. GOPAL MENON, Esq.,

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At this Conference annually experts on industrial problems are invited to present papers on subjects of supreme and pressing importance for the benefit of those who are interested in the industrial regeneration of the country. The problem of *production* is closely associated with that of *distribution* in the machinery of commerce, and the relation between the factory and the merchant's office is so intimate that it is difficult to consider them except in connection with each other. Methods of production have undergone vast changes in the past fifty years, manufacturing has been revolutionised by new inventions, improved machinery and enlarged demands. The steam engine of Watt, the steamship of Symington and the locomotive of Stephenson have given fresh opportunities for the training of a new class of workmen more intelligent than the old. It is, consequently, required of the Technical Schools to supply for these purposes young Foremen and Superintendents. Along with the wonderful revolution in the methods of production there have been wonderful developments in the methods of distribution. Business methods have undergone immense change, and the days have long gone by when men in business and industry were expected to learn their business by undergoing office routine. The idea that education in business can be achieved by mere rule-of-thumb no longer exists, and we find to-day more schools and colleges of commerce all over the world than under the old *régime*. It has been realised that industrial and commercial success in the future will depend more on educational superiority. Our late Viceroy, Lord Curzon, showed it emphatically while he distributed the prizes a few years ago at the annual

meeting of the London Chamber of Commerce, that the prosperity of a county by manufactures and commerce would depend on the attention paid to technical and commercial education.

In this paper I have the pleasure to give my views, based on my experiences as an educational expert and a man of affairs. I have been for the past thirteen years engaged in the training of commercial students, and also been intimately connected with the operations of a counting house, which had vast and varied ramifications of trade.

From that point of view, let me ask what is the modern conception of education in this work-a-day world, in which men cry "live and let live," and which

"Is a very good world to live in,
To lend, or to spend, or to give in ;
But to beg, or to borrow, or get a man's own,
The very worst world that ever was known."

But, whatever that may be, we must make the best of it, and education is the means whereby we seek to enable our young men, individually and as members of society, to make the best of the opportunities that present themselves by the development of their intellect and acquisition of knowledge. Education, therefore, in the popular acceptance of the term, is meant to be the professional or commercial equivalent to the German expression *Gymnasial* or *Real*. I am concerned mainly with the latter of the two. In speaking on the subject, I make no claim to originality, almost all that can be said upon the subject has already been dealt with by others ; and my present purpose, therefore, is to summarise and to make this a basis from which to urge further action in the interests of those who seek to organise a system of higher commercial education.

By Higher Commercial Education I do not mean that which enables a youth to look to a higher rate of profit or of interest on the capital embarked in the business, but that which trains him to appreciate fully the advantages of a commercial calling. It is that kind of instruction that prepares the future business man for his professional success. Such a training should enable him to compete successfully with the developments of the outer world. It

must be worked on a solid basis in order that it may serve its function for the preparation of the duties of life. It has been agreed by most educationists that the primary system of any education should not be the loading of the memory, but must be such as to conduce to the development of the mental faculties with a view to the formation of character and to that power and habit of good thinking which is so essential to a nation. In the primary period, the question of special training is out of the question, but considerations of utility should never be forgotten. Good grounding in primary education is the necessary basis of all secondary and higher education, whether professional, technical or commercial. The question, therefore, of a systematic and steady development of Commercial Education and a properly organised commercial school resolves itself into a question of culture—but culture in the real sense of the term cannot be imparted in schools. It must find its source in self-improvement and self-exertion, but the schools that train the minds of the youths should model their work in such a way as to give them a strong desire for self-culture and self-improvement. This is the true aim and object of all educational systems.

There is a general notion that commercial education is nothing more than the bare teaching of commercial subjects, and that methods of commerce may even be gathered by undergoing an apprenticeship in a routine of office work. The idea that a youth can enter a counting house and conduct his work satisfactorily after a period of apprenticeship is no longer possible, as a highly specialised knowledge of his profession, together with the wider culture which enables him to adapt his knowledge and his training to the varying demands of modern commerce, is highly essential. Commercial education, as Sir Albert K. Rollit, M.P., says, is the larger and better adaptation of education in general to commercial requirements. It is the special training for trade—an education which aims directly at fitting the individual for the needs of commerce and the application of general education to industrial purposes. Colleges and Schools of Commerce that conform to this ideal see that the cultural element predominates in the teaching of commercial subjects. The curri-

culum of a business college should be so framed as to enable the recipients of that training not only to serve intelligent apprenticeships in business pursuits, but also to enable them to achieve success in the discharge of the highest functions of the State.

It has been said that the commercial success of any nation depends on its educational superiority. There was a time when the sole object of education was to train men for ecclesiastical purposes ; at another period its aim was to qualify men for civic duty. We have already entered upon a period when men are recognised as parts of an industrial order, and education must, therefore, train the people for an economic citizenship. It is with social science and the demands of this citizenship that business education must deal.

The best preparation, therefore, is to afford a good general education—in fact, the aim of all systems should be to offer general or liberal courses of all standards and of the very best character, and get as many young men to pursue them as possible. It should then go further and allow those youths who have gone as far as possible in the liberal courses an opportunity to pursue their education still further along lines relating to their future calling. For instance, an education which is based on science and is properly organised cannot but be liberalising, no matter if it be technical in the proper sense of the term. In the same manner the curriculum of a Commercial High School or College may be sufficiently liberalising in all its aspects, at the same time that it trains a youth so as to make him more useful in a business house. The work of a good industrial or trade high school may be made thoroughly educational. It is work of this kind, which is liberal and practical, that educates a man while it trains him for a livelihood, and which should be introduced into any system of Commercial Education.

A commercial school which imparts instruction in the higher commercial subjects, viz., the History of Commerce and Commercial Institutions, Commercial Geography with the necessary preliminary work in Physical Geography, the study of Products, the theory and practice of Accountancy,

should be of general interest to every educated man, whether he is going to business or not, while the study of commercial law, economic theory and history, political science, banking and currency supply liberal courses of education especially adapted to the needs of persons who are or who intend to be engaged in any kind of administration. Such a study constitutes what is called the **SCIENCE OF COMMERCE**. By science of commerce I mean a systematic study of principles and usages of all branches of trade, buying and selling of different commodities, mercantile agencies, shipping, railways, insurance, warehouses, banking and speculation. Such a training, would constitute, a proper faculty in the Science of Commerce. Commercial education should then satisfy commercial needs, which can be ascertained only from a knowledge of the function of the mercantile classes.

In order to make the education imparted in a commercial school thorough and efficient, students before leaving school must be made to undergo a course of training in what is termed the "**PRACTICE OF COMMERCE**." The object of this course is to train the students how to apply to practical business what they have already learnt in various other subjects. It is not my intention to offer any remarks as to how this course should be pursued, but what I would convey is that the education imparted in a commercial school or college should be considered incomplete if the students trained there possess no knowledge of the definite functions they have to perform when they are thrown in the great battle-plain of commercial life. The various forms of ordinary trading, such as local sales, imports and exports, on one's own account and on commission, consignments, indents, agencies, etc., must be introduced by fictitious transactions, the leading data of which must be based, if possible, upon the transactions of a large public concern. Special attention must be paid to standing in account calculations, forward exchange contracts, commercial and banking correspondence, cable codes, etc.

I have dealt with the definition and scope of Commercial education that should find a place in the present economic order. The education that is required at the present day is

not merely technical, not merely literary, but it must be a combination of both. The possibility and value of commercial education to the future business man is of the greatest importance, for, as Lord Rosebery observed, the twentieth century is destined to witness a struggle for commercial predominance among the trading nations of the world. This pre-eminence can be attained only by a correct notion of the present commercial and economic situation, and that country will be most prosperous by trade and commerce which pays most attention to commercial and technical education. The future business man should have a clear conception of the production, distribution, and exchange of the various commodities that are produced in different regions of the world. He should be equipped with an education which will enable him to gauge correctly the state of the daily money market, glance over current prices, discuss the probable crops of corn, cotton, sugar, wool, silk, weigh the chances of foreign competition, and from all these data decide his own mercantile operations. Such a man must be a student of social science, a man imbued with sufficient knowledge to conduct his daily operations of the counting house. Such is the merchant of the future, and he may be likened to a great general sitting in his war office planning operations for a distant field of action. Commercial knowledge is impossible to attain without a thorough knowledge of a man's environments, and the victories of this twentieth century, as I have already pointed out, are economic, such as will rest with those who can best utilise the modern agencies of industrial and commercial life.

I am not, however, prepared to state that educational superiority alone is the only criterion of the commercial success of a nation. Educational superiority there must be undoubtedly ; but, coupled with this, the future business man must have an aptitude for his profession, he should believe in his work and love it, and then he will do better work and be happy in the doing of it.

" If I were a cobbler, it would be my pride
The best of all cobblers to be,
If I were a tinker, no tinker beside
Should mend an old kettle like me."

Such must be the ideal of a business man. He should have faithfulness and intelligent devotion in the performance of his duties. Business men must have business talents in born in them—successful business men are thought to be born, not made. This is not all that is required in a business man as a *sine quâ non* of his success—he should possess good moral qualities. In this connection it is well worth quoting the words of Mr. J. W. Gilbert, the pioneer of the system of joint stock banks in England. "Is it knowledge that gives respectability in commerce? What profession requires so much and such varied knowledge as that of a merchant? Is it utility to the State? What order of men tends more to increase the wealth and happiness of the State than that of merchants? Is it moral character? To whom is moral character so essential as to a merchant? Without this he is despised." A business man should have thorough experience of his special branch of business, without which he will drift without a rudder, and is always in imminent danger of catastrophe. Business cannot be reduced to an exact system of knowledge like medicine, law or theology. A business man's success lies in his wide general knowledge acquired with regard to his particular walk of life. It is impossible for him to become a specialist in all branches of trade, and one who tries to do all is likely to lose everything; the success you know is for the tortoise and not for the hare. In these days of keen competition and with the vast varieties of the different departments of trade that beset a business man, it would be well for him if he were to devote his attention to the specialization of trade, as otherwise success is difficult to achieve, whatever may be his merits.

I have explained to you the scope, value and possibility of commercial education, and the young man who has acquired a thorough knowledge of the modern methods of commercial education can never become a failure in his profession.

I shall now deal with the salient features of the educative value of commercial subjects in order to show that commercial education constitutes an intellectual training fit to rank with that of any classical, legal or scientific studies. I shall also dwell briefly upon the system of academic education in England, on the continent, and in America.

I have already pointed out that in order to make commercial education a success, the curriculum of the school should be made as liberalising in character as possible. A commercial school which imparts instruction in the higher commercial subjects, *viz.*, the history of commerce and commercial institutions, commercial geography with the necessary preliminary work in physical geography, the study of products, the theory and practice of accountancy, should be of general interest to every educated man; while the study of commercial law, economic theory and history, political science, banking, currency, supply liberal courses of education specially adapted to the needs of persons who are or who intend to be engaged in any kind of administration.

The science of accountancy or book-keeping, which is considered to be a dry subject, has, in my opinion, some excellent claims to be ranked amongst the educative subjects. We have often heard an eloquent vindication of the claims of several subjects by veteran educationists at the Educational Guild lectures and in educational magazines; but we have not seen many champions of book-keeping who have made themselves heard in defence of this important art. If a subject has to be ancient in order to be educative, book-keeping has the greatest merit. From certain allusions in the works of Pliny, it is evident that some sort of book-keeping was in vogue in his days, and from certain transactions entered into by Cicero, there is ground to believe that book-keeping takes its origin in the 14th century. Is book-keeping really educative, and does it really afford a useful mental discipline such as is calculated to render the mind better fitted to deal with general problems than before? I have no hesitation in answering both these questions in the affirmative. It is impossible to master the mysteries of book-keeping by double entry without having gone through a process of scientific training. This and other subjects that come under the category of commerce are, in a true and lasting sense, educative.

The question may now be well asked whether the curriculum of a properly organised commercial school or college be such as to create a Faculty of Commerce. That it is cap-

able of establishing a faculty of Commerce may be seen from the steps taken by the universities of England, the continent, America and Japan. The Right Honourable J. Chamberlain, the most distinguished citizen of Birmingham and Chancellor of that great modern university—the university of the business-man and not the mere academician—thought fit to establish in connection with the Birmingham University the first Faculty of Commerce in the United Kingdom, where the future leaders and organisers of industry should receive a thorough training of a higher and more efficient character than had previously been possible. Similar faculties were also created in London, Manchester and Leeds. These universities grant Bachelor's and Master's degrees in Commerce and Economics.

There are important universities of Commerce in France, Antwerp, Brussels, Russia and Switzerland. Space will not permit me to deal exhaustively with the system of education in vogue in these universities ; but suffice it to say that the graduates turned out from these institutions find themselves so fully equipped for practical business affairs that, soon after their leaving the universities, they enter the foreign market either as buyers or sellers, with an enormous advantage over the man whose education has been acquired under less systematic methods.

The universities of New York, California, Chicago and Pennsylvania have instituted Faculties of Commerce and Industry. The first of the institutions to give commercial education of college or university grade in the United States was the University of Pennsylvania, in its Wharton School of Finance and Economy. There are also universities of Commerce in Wisconsin, Vermont and Dartmouth.

Commercial education was considered by the first cabinet of the present Emperor to be very essential for promoting the foreign trade of Japan. The Japanese Government, in order to establish universities of Commerce, deputed their Government officials and students of commercial schools to go abroad to study the system of education in vogue in Western countries, and on their return they were appointed as Professors and in any kind of administrative work, including the service of Government, railways, banks

and insurance companies. The Higher Commercial School at Tokio stands now as one of the first commercial colleges in the world, the status and education of the graduates of which are at least equal, if not superior, to those of any of the continental commercial colleges.

From the above brief survey of the university system of commercial education, it will be observed that the cry in every quarter is EDUCATION FOR BUSINESS AND PUBLIC LIFE, and how best this education can be attained in business colleges. The object, therefore, of a properly organised commercial college should be to afford a systematic training in higher commercial subjects, in the study of Government and administration and in the work of economic and social investigation.

Turning now to the system of commercial education in vogue in India, I may be permitted to say that it is not of a very high order; nay it has not even touched the fringe of higher commercial education. The system in vogue is not such as to be compared with those existing in the European countries, nor is it of such a standard as to create a Faculty of Commerce. I would ask whether the time has not arrived in India to modify the present system of commercial education in a manner after the model of English and Continental methods and to create a Faculty of Commerce in the Universities of India. I have already pointed out that the curriculum of a properly organised commercial school should be such as to create a Faculty of Commerce. Success in the path of commercial education can be achieved only when our intelligent young men can be brought under the influence of this Faculty. The desire to secure a university degree is so great on the part of our young men that when a Faculty of Commerce is created a portion of the young men who are now preparing for the various degrees will take up this important branch of study, and thus in course of time a number of Bachelors of Commercial Science would be turned out who, unable to secure the much coveted Government appointment, would have to resort to commercial undertakings. The outlook clearly points to individual effort as the only means of success in life for the majority, and that effort must be directed towards Commercial and Indus-

trial undertakings. India will find a vast field in this rather than in the more highly favoured directions pursued at present by the young men of India, namely, Government service and law.

I may add that until commercial degrees are instituted in connection with Indian universities, and until students of commerce are made to realise that a knowledge of the higher branches of commerce is essential to the purpose, commercial education in commercial schools in India should aim higher than the modicum of clerical knowledge that will be required for a clerical post. Commercial instruction of a secondary standard has prevailed in India for the last twenty-two years, and it is certainly time to modify the methods of instruction. A great leader of educational thought in the United States has recommended that once in ten years an attempt must be made to formulate anew the educational doctrine, keeping in mind the changing social needs, the new literature of education and the practical experiments that have been conducted. A change in the system of commercial education is indispensable. Unless that change takes definite shape in the form of higher commercial education fit to be placed on the same intellectual plane as legal education, true commercial education would not lead its votary through the mysteries of *haute finance*, by which commercial students might hope to take an important part in the near future in the commercial struggle of the nations.

THE "LABOUR PROBLEM."

By KHAN BAHADUR BEZONJI DADABHOY MEHTA,

Manager, The Empress Mills, Nagpur.

While there is a general complaint of scarcity of labour in industrial centres, there is abundance of it in congested districts half starving through insufficient employment.

The scarcity is due really to increased employment. The extension of railways and other facilities of communications, the growth of inland and maritime commerce, increased agricultural activity, liberal programmes of Public Works buildings,

irrigation, and above all, the development of the staple industries such as cotton, jute, coal, manganese, etc., all these have led to a considerable widening of the avenues to employment open to every class of labour. Besides, the ravages of plague have exercised a potent disturbing influence, especially in regard to the larger cities, not merely playing havoc with the labour market during the epidemic season, but in many cases raising the level of wages permanently high. Again, emigration is taking away a good deal of labour out of the country. No wonder there should be cries of scarcity from many quarters, and the wages of labour both skilled and unskilled tend continuously to exhibit an upward tendency. It is true the textile mills are a remunerative market on the whole, but then they present one of the most unattractive spheres of employment under present conditions, and as such are, speaking generally, somewhat hard hit in the struggle to secure a sufficiency of hands.

There is, however, plenty of labour available in certain congested tracts, as the reports of Messrs. Foley and Fremantle (of the Bengal and the U. P. services) abundantly show. It will be remembered these two officers were deputed by the respective local administrations some time back to enquire into the causes of the inadequacy of labour supply in organised industries so far as it affected the areas under their control. The results of their labours have been given out in two admirable reports which, though dealing with the local situations in the main, afford much instructive reading to every employer of labour in this country. The gist of their main recommendations may be summed up in one word, —Immigration. "There would still seem" says Mr. Foley, "an enormous reserve of labour in the congested districts of the United Provinces to draw upon, and there need be no apprehension at present that the supply is likely to be exhausted." And this opinion is fully endorsed by Mr. Fremantle in his own report. In fact, there would seem to be no room for doubt that there are immense potentialities for a plentiful supply of comparatively cheap labour in numerous congested areas. Only, it needs sustained and organised efforts to coax it to leave the paternal home where it half starves, and migrate to industrial centres affording more lucrative pursuits.

The first essential to success in this direction must be a thorough combination and association among the employers themselves. I may say from personal experience that individual employers find it practically impossible to do the recruiting themselves each in his own way. It imposes too great a strain on the financial resources of any single concern, the more so as the latter is powerless to check the inroads of his competitors on labour imported at much trouble and expense. In fact, we can only hope to succeed in this line by the earnest co-operation of all interested in the matter.

If the industrial bodies are really in earnest to obtain an adequate supply of labour, it is necessary that each industrial centre should have a society of its own: it should have a practical and thorough organization under which reliable recruiting agents might be appointed. They should go to the congested districts, explain to the people there the advantages of industrial employment, facilitate their emigration, look after their necessities while in a state of transition and while they establish themselves in what to them may seem strange lands, introduce them into the way of learning their new occupation, and, step by step, leave them to help themselves in their new sphere of life.

Government would no doubt upon proper representation being made, come to the aid of such societies by asking their district officers to give from time to time information regarding insufficiently employed or unemployed labour wherever available through the Government Gazettes, or what would suit the industrial communities best, through the *Indian Trade Journal*.

But even for such a scheme to succeed, I must confess, our factory system specially, and other industrial works generally, are too exacting and unattractive. The hours of work are too long, the conditions of life demoralizing and destructive of domestic happiness, however little that may be.

The imported labour, that is the new comers, accustomed to open air, little work, and stay-at-home habits, on being introduced into a new way of life, are instantly bewildered by the moving machinery, the noise all round, the stuffy atmosphere, and, what is most repellent, the confinement from dawn to dusk and even up to late at night, more frightful than even

jail life. No wonder the first impulse, even for the starving people, is to run away, regardless of consequences.

Shorter hours of work, regular holidays, fairly good wages, well ventilated factories provided with sanitary accessories, pure drinking water, and healthy dwellings are necessary to keep the operatives in such a state of health and ease, that they may show interest, if not zeal, in their work, and may not wish to leave it. Pensions, provident funds, leave rules, would make the workers highly contented.

In fact, the employers must not treat their men as so many human machines to be worked until they have so depreciated as to be "scrapped," but they should consider the interests of both to be identical. The welfare of the one must needs conduce to the welfare of the other.

It is fortunate, or unfortunate—I should say unfortunate—that hitherto, owing to the illiteracy and ignorance of the labouring classes, there are no trade unions demanding their legitimate—and at times illegitimate too—rights, and it behoves the employers, before such unions are an accomplished fact, to do all in their power to satisfy the just claims of their employees as human beings. This will really and truly lead to their mutual welfare.

INDUSTRIAL BANKS.

By MAHADEV RAJARAM BODAS, ESQ.,

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The important part which is played by banks in modern times in promoting the trade and manufactures of a nation is now recognized in all civilised countries. Banks are the arteries which supply the life-blood that nourishes the different branches of commerce and industry; and skill in financing an enterprise is always the *sine quâ non* of ultimate success. National trade usually develops by the increase and spread of mutual credit, while arts and industries flourish only when the trade of the country is in a prosperous condition. Banks, by drawing together the scattered cash in society in a safe and public receptacle, serve like reservoirs that first collect rain and subsoil water, and then fertilize the surrounding

land with it. They employ the superfluous wealth of some individuals for the use and profit of others, and the ultimate benefit of the whole nation. If money is power, these banks, if properly managed, concentrate this national power and direct it to a definite and approved aim. In a country like India, where capital is usually stationary and trade is comparatively sluggish, a financing agency like a public bank is an absolute necessity to accommodate enterprising traders and supply the needs of current business. Every industrial or trading centre in India has hitherto contained a class of sowkars or bankers, each of whom finances and controls his particular set of clients carrying on some one industry. Thus there are sowkars in every village to help agriculturists to pay assessment and buy seed. In weaving centres like Sholapur, Yeola and Malegaon, there are sowkars who supply money on yarn to the weavers, and buy the products of their looms in exchange. In cities like Bombay, there are capitalists who advance money on cotton or opium and earn a handsome profit thereon. But times are coming when such individual financing will not suffice. Every branch of trade and manufacture is rapidly growing in magnitude as well as intricacy; and an incorporated bank, with a large capital and managed on modern methods, can alone meet the multifarious demands of present times. The necessity has long since been recognized in larger centres of commerce, and cities like Bombay, Calcutta, Delhi and Lahore already boast of several organised and well-conducted Indian banks. But the smaller towns and rural districts equally want them. The needs of the agricultural classes who form the bulk of the population in villages may be partially satisfied by the new cooperative credit societies initiated by Government; but no such concerns can really be proper substitutes for a well-organised bank with a large reserve capital. The question of the establishment of such banks in different centres of business is vitally connected with the problem of developing Indian trade and industry.

It is a necessary corollary to these general principles that these banks, syndicates or credit societies, by whatever name they may be called, must be suited, in their scope and constitution, to the circumstances and the object to be served in each particular case. Exchange banks, Deposit banks,

credit societies or urban associations, each of these serves a special purpose and ought to be adopted for it. Rural and urban societies, such as are now being formed in all districts under the auspices of Government, may largely help agriculturists and other handicraftsmen by advancing small loans on personal security, and they are often effective in keeping those classes alive and in normal condition ; but they are too petty to promote new manufactures or revolutionise an industry. Special industrial banks are necessary to give financial help to ensure proper organisation of new industries. Such industrial banks are rapidly multiplying in all civilised countries, and in New York, Chicago and other large cities of America we often find a separate bank established in each street. The chief function of these banks is to receive deposits and to invest the money in advances to enterprising manufacturers or artisans on good security at a moderate rate of interest. With good management as well as honest and close supervision, there ought to be very little risk in such investments ; and the chances of a loss by failure or dishonesty in any particular business can be minimised by framing strict rules for giving loans and taking security. A committee of good and honest businessmen can easily find out in each case whether the applicant for a loan is fit, and the security offered by him is sufficient to cover at least the principal of the loan. These loans are repayable with interest either in lump or by instalments within a number of years, and in the meantime they are made a charge on the profits of the business. The proprietor of a successful business is always glad to pay not only good interest on the loan, but also the capital in order to be freed from the over-hanging burden as early as possible ; while the bank gets not only handsome interest, but also the credit of having introduced a new business or factory in the country. Some of the existing banks in India may be doing this kind of business in exceptional cases, but there is at present a great want of separate institutions started with this object alone. Ordinary banks on account of being closely involved in current transactions of trade or exchange cannot afford to lock up much of their capital for a long time in long-standing advances on machinery, building or the equipment of a factory. A special industrial bank with an

expert manager and a suitable committee of advisers is therefore an absolute necessity to achieve the object.

The question of starting such industrial banks ought, therefore, to be immediately taken in hand by leaders in different provinces; and I earnestly request the delegates to this Conference not to go home unless they formulate a workable scheme. The time has not perhaps come to start separate banks for each district, but it is quite possible at present to establish one for each province. This province or territory of each bank should, I think, at present be formed on the basis of language, as the operations of the bank will require very close and constant inter-communication between the manager and their clients. Thus a bank may be established for Gujarat, another for the Deccan, one for Sind, another for Bengal, and a third for the Punjab, and one each for Telugu and Tamil-speaking Madras. The capital of each of these joint stock banks may be from 5 to 10 lakhs according to requirements, and the shares may range from Rs. 25 to Rs. 100. The shareholders may be paid a dividend of not more than 5 per cent., and the depositors from $3\frac{1}{2}$ to $4\frac{1}{2}$ per cent., while all surplus profits ought to go towards a sinking fund to recoup accidental losses, and to pay bounties and other aids to growing industries. The interest on loans should not exceed 6 per cent., except in exceptional cases, and the advances should be made either on very good personal security or on the security of immoveable property, machinery or stores, proper care being, of course, taken to see that the security is good and sufficient. An Advisory Board of disinterested experts should be appointed for each bank to sanction loans and examine securities, and an agency to gather full and reliable information about each applicant may also be needed. Good and honest management is of course absolutely necessary to ensure success, but if the institution is started under good auspices we may rest assured on this point.

The utility of such banks in helping enterprising manufacturers and thereby promoting new industries can never be overrated. We often come across men who are clever artisans or who know a valuable trade secret or who are anxious and capable to start a new industry, but who cannot do anything for want of capital. There are many manufacturing concerns

that yield no or very little profit, simply because there is no good and up-to-date machinery. There are many people who know valuable processes, which cannot be turned to account for want of means. An industrial bank will help these men by timely help and thereby become the mother of so many different industries. I may give another illustration. In a recent trial in Germany, it came out that almost half the factories in Germany are worked by machinery that is given on loan by the makers, who agree to receive the price in instalments. Now, if some such facility is provided to Indian artisans or capitalists who cannot command a large sum at once to sink in machinery or deadstock, many of them will readily start new factories and produce articles which we are just now importing from foreign countries. So long as there are no manufacturers of machinery in India to give such facilities, an industrial bank is the best agency to achieve the purpose. The point in fact is so clear that I do not think I should dilate upon it here at greater length. My object in noting these few observations has been not to lay down a definite or hard-and-fast scheme, but to draw your attention to a subject which, in my opinion, demands your most urgent consideration. Let us hope that something will be done in this direction before the next session of the Industrial Conference.

CO-OPERATIVE CREDIT SOCIETIES.

By W. R. GOURLAY, Esq., I.C.S.,

Registrar of Co-operative Credit Societies in Bengal, Calcutta.

The great necessity of Indian Agriculture is cheap credit. At present the agriculturist is being financed at a rate of interest varying from 25 to 50 per cent., so that he is unable to take advantage of any improvement which does not give a return of over 25 (or 50 per cent. as the case may be) on the capital invested, and therefore unless the good and careful agriculturist can obtain capital at a rate not exceeding 12½ per cent., the usefulness of our great Agricultural Departments will be enormously curtailed. Everything is being done to build up an Agricultural Department in each province in India which will compare favourably with similar depart-

ments in other great agricultural countries. The present scheme for development will not be fulfilled for 5 or 10 years yet, and therefore now is the time when we must put forth every effort to cheapen credit, so that the labours of the Agricultural Departments may do the maximum of good to the community. Hence the importance of the subject with which we are dealing. The cheapening of rural credit must be the foundation of all agricultural improvement.

To prevent any misconception of the aim before us, I will state the problem in the words of the last Famine Commission's Report: "We attach the highest importance to the establishment of some organization or method whereby cultivators may obtain, without paying usurious rates of interest and without being given undue facilities for incurring debt, the advances necessary for carrying on their business." In considering the subject, we must keep these two factors clearly before us: we have to find out a method for the supply of cheap credit, but it must be a method which does not give undue facilities for incurring debt. We must make certain that our scheme for obtaining capital for the raiyat does not cause him to sink deeper into debt. It is this which has rendered the problem so difficult of solution. When the Agriculturists' Loans Act was passed, an attempt was made to meet the problem of cheap credit in times of special need; but though the Act has been productive of much good, it failed to solve the latter part of the problem. It must not be thought that the total abolition of the village money-lender is involved. The village capitalist is as important a part of the village community as the carpenter, barber or washerman. He renders a service without which it would be impossible for the cultivator to carry on his business. What is sought is to ensure that money-lending in rural India is placed upon a more economic basis. At present the money-lender has a monopoly, and he is not to be blamed if he makes full use of his opportunities. The money-lender makes great losses as well as great gains, and what we want to do is, as far as possible, to eliminate the losses, and to ensure that the good and careful agriculturist is not compelled to pay an enormous rate to cover the bad debts of his less careful neighbour. We are not seeking after a Utopia where the raiyat will obtain his

capital without interest and the money-lender will be non-existent. We want to guide the capital of the money-lender into useful channels and to prevent the enormous waste which goes on every year. There will always be gamblers willing to take risks on doubtful security. We want to separate the legitimate investment of capital in agriculture from the gambling in doubtful securities.

The solution of the problem, we believe, we have found in the establishment of co-operative credit societies.

The object before us is the greatest which any man who loves this land and its people can set before him. Every man can help, and his help will be more than welcome. It is not money that we want but men. The villagers are ready and willing to pay a rate of interest which will attract capital, but we want men to spread a knowledge of the principles of co-operative credit and to counsel and guide the people in carrying them out.

I have said that we believe we have found the solution of the problem before us, and it is natural, before I can command your attention to the subject of co-operative credit, that you should ask the grounds for this belief. If you will listen for a moment to a few statistics, I will convince you that we have reason for believing that we are right.

Three years ago an Act was passed which rendered the establishment of co-operative credit societies possible, and during these years a little band of men, not only officials but Indian and European gentlemen, who have the welfare of the country at heart, have been working quietly and slowly with one aim in view, and here is the result. In India central, urban, and rural societies have at present assets amounting to over 25 lakhs of rupees, and during the past year they did business to the extent of 37 lakhs. But to-day I will confine my attention to the work done by the rural societies alone. Every penny of the money invested in these societies has gone to financing the agriculturist or the village artisan, who in this country is dependent almost entirely on the proceeds of agriculture. As a result of these three years' work there are at present in India 735 rural societies, their capital amounts to 11 lakhs of rupees, half of which has been subscribed by the members themselves, one quarter has

been lent by the Government, and one quarter has been borrowed from outside. During the last year loans amounting to nearly 12 lakhs were given out, and the total cost of management amounted to only Rs. 7,000. Throughout the year no debts have been written off and no losses have been sustained, and the reserve at the end of the year amounted to half a lakh of rupees.

It is but natural that you should ask what is the history of this co-operative credit and why its principles were not applied to the country sooner. This I shall endeavour to give you as shortly as possible. The problem of establishing some organization or method whereby cultivators could obtain without paying usurious rates of interest, and without being given undue facilities for incurring debt, the advances necessary for carrying on their business occupied the attention of many philanthropists in Europe in the middle of the last century. Many schemes were tried, and three of these succeeded, and are to-day magnificent examples of the self-sacrifice and devotion of Raiffeisen and Schulze in Germany and Luzzatti in Italy. Raiffeisen and Schulze commenced their work about the same time : each had his own ideas, and their systems have succeeded in different spheres. Raiffeisen societies have succeeded in the country and the Schulze societies in the town. Success did not come at once ; but only after weary waiting. Many difficulties had to be overcome, and not the least of these was the opposition of a well-meaning but misinformed Government. It was not till 1893 that the complete success of both schemes was recognised outside of Germany. Luzzatti and Wollemburg followed the lead in Italy and Haas in Darmstadt, so that now there is hardly a corner of Germany and Northern Italy where credit societies are not known and appreciated.

The success of these schemes attracted the attention of Sir Frederick Nicholson, who was in 1893 making a special enquiry into the possibility of establishing land and agricultural banks in Madras, and it is to the result of his labours that we owe the progress which has been made in India.

I do not propose to deal with each of these systems, but only with that system which has been proved by experience to be most suited to the conditions of a rural community

dependent on agriculture such as we have in India, namely the Raiffeisen societies ; that these societies were the most suited to rural India was the mature opinion of Sir Frederick Nicholson set forth in his exhaustive report, and it was the opinion of the special committee which discussed the question before the Co-operative Credit Societies Act was framed, and the justice of these opinions has been proved by subsequent experience.

Raiffeisen societies are small democratically managed groups of agriculturists, who join together for the purpose of making their individual securities of greater value, and of enabling each member to obtain benefits which though possible for all when united are impossible for each individually. Every man possesses some security, or at least has it in his power to possess something which serves as a basis of credit, namely, a character for honesty among those who know him well. He may have no money, he may have no property, but he has it in his power to build up a character for honesty in his dealings ; and all those who know rural India well, know that this character for honesty does exist in the villages. The majority of cultivators within their own villages have a character for honest dealing among their neighbours, and it is this character for honesty which is the basis of all co-operative credit. In India we wish to attract the poorest of the poor, and therefore we cannot ask them to make payments towards the capital of their society. But what we do ask them is to stake their character and all that they have for the benefit of each other. The security offered by the society is the unlimited liability of its members ; every man agrees to be liable ' up to the hilt ' for any loss that may occur. I have often been asked what the security which the societies have to offer is, specially in cases where the tenant's right is not transferable--the security lies in the fact that no one wants to be sold up : every man's interest is to see that there are no losses, and experience has proved to us that where this is the case no losses can ensue. The security is a personal security, the finest security which exists, and the greatest security in India where a family seldom leaves its native village. It is the fear of being made liable which makes the members careful in their management.

As there are no shares in these societies, so there are no dividends: the interests of all are alike: there is no antagonism between the borrower and the lender. It is to the interest of all to serve and, therefore, no services are paid for. The members are left to make all their profits from the use to which they put their loans. Such a system, founded on unlimited liability renders the management democratic and also renders the business safe: the greatest qualification of an institution which desires to borrow money. Every member watches his neighbour, so that he himself may not be involved in loss, and if his neighbour misuses the money the other members recall the loan, so that they may not incur any loss, and the result is that the loan is not misused. Without unlimited liability it would be impossible to create the self-interest which renders, free of charge and more efficiently, all the services of a highly paid staff.

The moral effect of this on the members is no dream and, to take the lowest view of co-operation, the individual member speedily realizes that honesty is the best policy. It has often been stated by those who have had no experience that no cultivator will agree to these conditions, but the cultivator knows well where his own interests lie, and when he understands the principle, he sees that it is to his own self-interest to join the society: the advantages to be obtained far outweigh the disadvantages.

Such a community as I have described might easily fall to pieces at any moment through dissensions amongst its members, but to prevent this, to form a bond which will always hold the members together, allowance is made for the building up of a reserve fund. The rate of interest at which the society lends money to its members is greater than the rate at which the money is borrowed, and from the profits which ensue this fund is built up. As there are no shares, so the interest of all the members in this fund is alike: but it is the property of the members collectively, and no member can claim a share. The reserve fund thus becomes not only a capital of guarantee, but also the strongest bond to hold the members together; for a man can retain his interest in the fund only so long as he remains a member.

You will realize at once that this system is only suited

to small rural communities where every man knows his neighbour's character, where comings and goings are few, where on man's transactions are hidden, and where it is possible for every one to watch his neighbour without unnecessary interference, and this is an exact description of the life of the greater portion of rural India.

I have described to you the principles upon which Raiffeisen societies are founded: the next important question to consider is the source from which capital is to be obtained. A great majority of the members join from self-interest: they have no money to deposit, they have come to borrow. Capital must in the first instance be sought from outside, and it is here as you can imagine that new societies find difficulty. Until confidence has been established it is hard to attract capital, and without capital the society is not in a position to demonstrate its trustworthiness. Capitalists, however, have been found who are willing to take the risk, and Government too has shown its readiness to assist. But this is only a temporary expedient. The aim is to attract local capital, and most of all to attract the savings of the members themselves when the benefits of cheap capital have placed them in a position to save. Societies can never succeed unless they have a good business foundation and, therefore, the rate of interest which they are willing to pay must be such as will attract local capital when the trustworthiness of the institution has been clearly demonstrated. In my own province I have found that this rate lies between $12\frac{1}{2}$ and $18\frac{3}{4}$ per cent. according to the circumstances of the locality, but as success crowns our endeavours this rate will be lowered.

Meanwhile we are putting forth our efforts to prove that the security is good, and so long as the members receive sufficient benefit to induce him to agree to the terms of admission, the rate of interest the societies are ready to pay must not be lower than that which will attract the local capitalist. The aim is in the end to divert the money of the local capitalist into this channel, so that he will receive what he considers a fair return on his money, and the borrower will obtain the full market value of his security.

The risk that a man takes in placing his all in the hands of his fellow-villagers would be very great were it not for

certain safeguards which I will explain to you. The first of these is that the society confines its business to its members : lending to outsiders is prohibited, and the operations of the society are confined to the village within which every man knows his neighbour. Members from outside, be their security never so good, are not admitted. The danger of making a mistake is too great, and the village community has no hold over an outside member. Within the village, if a man is good enough to trust he is good enough to be admitted as a member ; while if he is not good enough to be admitted as a member, he is not fit to be trusted. The members have the power to exclude, and if they admit a man with their eyes open that is a proof that his neighbours trust him. The second safeguard is that every member, before he receives a loan, must state his case to the others. He must tell them what he wishes to do with the money, and they decide whether it would be safe to let him have the loan and how much he really requires. The third safeguard is that the member is bound to use the money for the purposes indicated. If he does not do so the members call the loan back for fear of being involved in loss. The fourth safeguard is that every member has to find two of his fellows to be his sureties for the repayment of the loan, and on these sureties falls a special inducement to watch the use made by the borrower of his money. Members are induced to take this responsibility by the knowledge that they themselves will have to find sureties when they come forward for a loan. The result of these safeguards is that societies of this description have been found a safe repository for money, and up to the present not a penny has been lost either in Europe or in India.

I think I have said enough to prove to you that Co-operative Credit Societies of the nature described are sound institutions consistent with village life in India.

It now remains to give you a short account of the manner in which they are managed.

The societies are democratic : the management lies in the hands of the members who appoint from their own number a panchayat or committee of five to do the work for one year, and one member of the committee keeps the simple accounts which are necessary. When a society grows

larger, the Secretary member is permitted to employ some one to assist him. The members of the committee are not paid : there is little work to do, and it is to the interest of each member to take his turn in managing. The members are not paid, because in the first place the rate of interest would have to be very much raised to make this possible, and in the second place, as it would always be to the interest of the committee to be re-elected, they would be inclined to manage the society with a view to secure re-election rather than for the benefit of the members as a whole. When they are not paid it is to their interest to manage the society for the benefit of all, and when their year of office is over they are ready to lay down their responsibilities, and let some one else take them up.

This committee cannot be worried to do business for the members every day, and, therefore, one day a month, usually the day of the full moon, is fixed on which the panchayat meet. When a member applies for a loan the committee consider three things : the first is the necessity for the loan, the second the instalments in which the loan is to be repaid, and the third the sureties in the event of the borrower's death or default. The committee know exactly the circumstances of each member, and they have no difficulty in coming to a decision concerning the necessity for the loan. They also know the member's capacity to repay, and the great principle of repayment is that the loan should reproduce itself either by creating new values or by effecting a saving : for example, if a man borrows money to repay a loan contracted at exorbitant interest, the instalments would be fixed by the committee after considering the difference between the rate of interest which the member formerly paid to the mahajan, and the rate of interest charged by the society. When, however, money is lent for the purpose of raising a crop, the whole loan must be repaid from the sale of the produce. When once the committee have decided concerning the necessity of the loan, and the member has agreed to take it, the money must be applied rigorously to that purpose. A man who has taken a loan for marriage expenses is not permitted to purchase a pair of bullocks with the money : the control over the borrower is gone, if he is permitted to change the purpose

concerning which the committee have already deliberated. The instalments vary according to the circumstances of the member : one man grows tobacco, he pays when he sells the crop ; another man has jute, he pays when he receives the price of the jute ; another man is a labourer receiving a monthly wage, he pays a fixed amount each month, and so on. The instalments are settled between the borrower and the committee. The power of the committee to lend, however, is restricted to a certain amount, and their power to borrow on behalf of the society is also limited by the members.

Alongside the committee of management there is a committee of supervision, the duties of which are to check the accounts at stated intervals, and to watch the use made by the members of their loans, and to report to the committee in case of misapplication or where the conduct of the member is such as to impair the security of the society.

I have now explained to you the principles, and the manner in which these principles are applied. In order that you may be able to carry them away in your minds I will go over them again. The main principles of the Raiffeisen Cooperative Credit Societies are seven in number :—

- (1) Unlimited liability ;
- (2) Operations restricted to a small area ;
- (3) No shares and consequently no dividends ;
- (4) No payment for services rendered ;
- (5) Repayment of the loan from the profits or savings effected ;
- (6) The moral as well as the material benefit of the members.

These seven principles have been the foundation of what has been done in Europe in the last half century, and have led to success there. Here in India our success is due to building on the same foundations.

One thing remains : the societies as I have described to you are small, and in many cases weak, but as the members have become strong by combining, so the societies in Europe have become strong by associating themselves together for purposes of finance and control. It now remains in India to organize the individual societies into unions, such as exist in Germany. This is the great work which is occupying the

attention of those interested in the movement at present, and as success has been attained in Europe so we confidently look for success in India. When the societies are thus united they will be in a position to offer security for one another and so to increase the security of the individual society in the eyes of the public and consequently to obtain their capital at a lower rate. The union, too, will serve as a convenient channel for regulating the excess of capital in one society and the need of capital in another and it will be to the interest of the older societies to teach the younger ones and to see that they follow the principles in their work.

Such then is a short outline of Cooperative Credit Societies, and I think you will agree with me in believing that the application of these principles will in time solve the problem of Indian indebtedness ; but we want help. We do not want money from Government to assist us, we want the willing cooperation of those who have the welfare of the people of this land at heart to help us in spreading a knowledge of the principles and to guide and counsel the members of new societies. Money will come but we want men who love the country and its people : men who are willing to give their time and their labour towards helping their struggling brethren. Men who believe in this work and who are in entire sympathy with the people. There can be no grander work for a young man than this. It demands no great power and no great learning ; it demands only sympathy and patience. It is the grandest work that a man can take up for his country.

THE PROGRESS OF COOPERATIVE CREDIT SOCIETIES IN THE BOMBAY PRESIDENCY.

BY C. S. CAMPBELL, ESQ., I. C. S.,

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We have before us here a large subject ; and I have before me a short time only, in which to write it up. At the best, I can but be superficial. However, I satisfy myself that an outline only is required, and that the progress of the movement *as a whole* is the object of inquiry. But, first of all,

having discovered what we mean by "progress," let us see what the words "Cooperative" and "Societies" may impose on us; to say nothing of the familiar words "Bombay Presidency." We ask vaguely, perhaps, how is "Cooperation", or the "Cooperative movement", getting on in your parts? Much as though we might ask, how is "inoculation" doing in your part? We know what we mean by "inoculation", but who knows what "Cooperation" may involve, or lead to? It may take all sorts of forms, rather like a Government: it may be centralized or decentralized, monarchical or socialistic or even nihilistic: as a matter of fact, with the prevailing democratic turn of modern ways, it has taken a turn for democracy. Let us be content, for the moment, with one form; or two at most:—the democratic, and the philanthropic (illogical as this may sound).

Then "Societies"? What is a Society? There may be trading societies, religious societies, literary societies, and so on. Ours are "Credit Societies." And "Credit Societies" may deal with different classes of people; or different objects of credit. We may take our stand on "cash"—"hard cash." The difficulty of obtaining it, sometimes, for one's societies, might well give it its name! Now in a small area, say a Taluka, we might find a shoal of societies all more or less identical in form and working; very much as the Kunbis of the Taluka would resemble one another. But, we have the Bombay Presidency to deal with; that is, we may well say, roughly five different countries, or parts thereof—Sind, Gujarat, the Konkan, the Deccan, and the Karnatic. Sind we will omit; I visited it, and had two societies there originally; one failed to start at all after registration, and was cancelled; the other is, I believe, flourishing to date: but, the truth is, I have recently handed over that corner of the Presidency to a local Registrar. We are left, thus, with the Presidency proper; and for convenience' sake, we may simply divide it into three parts, corresponding roughly to its three different languages of Gujarati, Marathi, and Kanarese. The division is very practical from an administrative point of view; for the fellow-feeling that makes us wondrous kind is considerably helped out by a mutual understanding of language. "Cooperation" assumes a wider sense when it bridges over intervals of lan-

guage and custom. Perhaps we shall get there before we come to the end of this paper ; which has been long enough beginning.

We are to study then certain democratic institutions, co-operating credit to secure cash ; the atoms, as it were, of " Cooperation " ; and this in, roughly, Gujarat, and the Marathi and Kanarese countries.

Our standard, by the bye, is Act X of 1904 (India), and the Rules (Bombay) thereunder. Let us proceed by countries first ; from base to head ; and then to middle, last but not least, and perhaps the most vital part of all.

The Kanarese country was fortunate in its founder of " Cooperation, " my predecessor, Mr. J. McNeill, who was attached to Dharwar. So Dharwar led the way with seven out of the first nine registrations ; and Gadag Taluka claimed the first three of these. Here was our nucleus, and here is our nucleus still, in the South. The North has one now of its own, but not so full of life ; and the centre too at last, but not nearly so full of definite character yet.

Gadag Taluka has in all ten societies, one only Urban, the rest Rural. The terms " Urban " and " Rural " I may add, for any who may not know, are imposed by the Act, the former being applied to non-agricultural, the latter to agricultural societies. For instance, if in Surat, the agricultural population formed themselves into a society, it would be Rural ; while a society, of petty village boot-makers, or the like, would be Urban. The constitution of the two may be identical.

Betgeri Society is our Urban Society of the Gadag Taluka ; it is open to all classes ; the liability of a member is limited to any amount unpaid on his share or shares. The value of a share is Re. 1 ; and one share at least must, but one only need, be taken up by each member. There is a committee of not less than five members to transact business. They are elected yearly at the Annual General Meeting. Membership of the society is subject to election by this committee, and is limited to residents of Betgeri and Gadag (the two places together forming one Municipality). The committee will be responsible too, for borrowing and lending, and for seeing the accounts are properly written up. They must appoint a Secre-

tary; of course, who may be merely a paid servant, like a Municipal Secretary. Loans to members (and loans are never made to non-members) will carry 9 per cent. or so interest, not lower. In the word "non-members" I do not include other registered cooperative societies round about in the Gadag Taluka. The society may lend to them. But they, if not members, are yet as it were sisters or daughters. We want more of these god-mothers (not step-mothers). Then, besides borrowing from without and lending within, the society deals in deposits. Deposits short of the year draw $4\frac{1}{2}$ per cent. interest; beyond that they draw anything up to 6 per cent. The society's capital now is roughly Rs. 10,500.

Let us step into a Committee Meeting (as I once did unexpectedly). There is an air of business about, a heap of cash, hard cash, on the table, a Secretary writing away or rising to show or ask questions, learned looks on all brows. There is the Chairman, with his colleagues this side and that. A man is standing up waiting to be certified that his deposit of Rs. 100 (I happened to pitch on a day when a man brought Rs. 1,000 !) has been accepted and duly entered in his name. No sooner is he gone than another comes with one rupee and a request to be admitted as member : the rupee is the price of his share. A discussion follows—where does he live, what does he do, is he hard-working, is he likely to remain in the place, does anyone know him specially well, will he be honest enough to lend to ? Facts are considered, probabilities are weighed, and a majority elect him. Next week he will come again, not with money but for money. His rupee satisfied the society, the society is now to satisfy him with Rs. 50. He is a carpenter, and needs a supply of wood and a few new tools. After him, in comes a well-to-do member who wants Rs. 500 to increase his shop premises. The matter is discussed, his security demanded, his prospects considered, and it is finally agreed by the majority that Rs. 300 will suffice and be safe. Here we may leave, while they toil on to see that everything is written up and signed, proceedings, accounts, documents, &c. They are responsible to the society for good business and honest dealings. But, who has set this all in motion ? I have mentioned Mr. McNeill ; I must mention another gentleman round whom the society

delights, apparently, to revolve as round a pivot, namely Canon Rivington, who wisely, however, says to them—"there is my opinion, but it is for you to decide." At Barsi I have a somewhat similar society; and I like to consider my friend Mr. Sane as the counterpart to the Canon; though I believe he has more to contend against. We are very cosmopolitan in our cooperative work, and the question is not so much—who is he?—but, what work does he do? We want men who will work, not only preach and promise. The committee must work, the Secretary must work, the borrowers must work, and the society must work and work at a profit too. The local depositors, even, will work; to see their money is not squandered, and their neighbours do not default. Outside depositors or lenders lend or deposit on a name already made, on an audited balance-sheet, and on strictly observed bye-laws.

I look on Betgeri and Barsi more or less as ideal types for Urban Societies, mediums for the dispensation of local or outside capital to the less favoured members of the same community, lending societies and savings-banks combined, instructors in business and morals, delightful channels of communication to unite the rich with the poor. Let the rich be kindly and humble, and the poor know their place; and "Cooperation" will be there at its zenith. But what about "Rurals," the predominant partner in the business? In what do they differ? In the liability of the member mostly. Nor do they go in for shares or dividends. They want something simple, something intelligible to the man behind the plough. He knows what a field is, and he knows what a field needs, and he knows what he wants but has not got; that generally resolves itself into "money." The Savkar he has; but he does not know what he borrowed from him, what he pays or has paid to him, what he still owes him, nor whether he will ever get any more out of him. All he knows is that the Savkar is still alive, and asking; and threatening, perhaps, a suit, in which his land may go. The "Cooperative" movement turns towards the agriculturist first, much as a doctor turns first to his most ailing patient.

Let us visit Hulkoti, then, just by Gadag, and see what its society can tell us. We are met by an honourable Patil,

Mr. Shiddangawda, and told he is the Chairman. With him are several others, more or less leaders too; and with them is the schoolmaster, who we are told, is the Society's Secretary. We find that their capital stands now at Rs. 10,500, of which Rs. 4,000 (from the Bombay Urban Society) is entirely devoted to redemption of old debts, on land-bonds. We find they are charging $9\frac{3}{4}$ per cent. on loans to members, and giving $6\frac{1}{4}$ per cent. on fixed deposits. We think at once of investing in these paying "deposits", but are told that such a privilege is reserved as a rule for "members only"! What will they give then for a loan? They look at their books and find only five demands outstanding, just at present, for loans from members, they have Rs. 175 odd at hand, in the Post Office, instalments to the amount of Rs. 872 are due next month (will very likely be paid before date, with correspondingly reduced interest), so that altogether they have no immediate need of our money; though they may shortly. Again, we are disappointed? But then, remember, we are dealing with one of the best, if not the best, Rural Society we have in the Presidency. We may expect them to be cool-headed and sure-footed. We ask about their membership, and find there are 123 members. The liability is unlimited; each is equally liable to gain or loss; and they are together more like a little family, a village within a village, ruled by a Panch, than a "Company established by law." The greater the danger the nearer are they likely to cling; unlimited liability is just the thing they understand, the thing outsiders value; not one man's credit, but the combined credit of all. We need not ask what they spend their money on: we all know the ordinary needs of agriculture and the agriculturist, and we have above alluded to the special need of redemption from previous burdens. Even in Hulkoti there is probably plenty of more room for money—money to be safely invested, and well used when there. And the golden rule of "line upon line" may not be quite in keeping with the desideratum of "loan upon loan."

I have spent so much time upon two societies (out of a total of 91 in the whole Presidency, excluding Sind) that people may be feeling they don't know to what lengths I may be going next!

The truth is a very few homely details about a living person may be worth much more than an elaborate character-sketch in a novel. I have been trying, with results of which I am the opposite of proud (the heavy burden of work with my special plague duty added must be my apology), to convey the inquirer into the middle of a village and town where co-operative life has begun, and is going on vigorously. I wonder whether I have allured him to attempt something of the kind near his own home (charity begins there) or stirred up his conscience to the possibilities of good that lie before him. Societies do not beg for money, they work for it. And honest work is probably a better security for repayment than numbers of sureties, or a house full of gold. It was meet, too, to dwell at length on two "Dharwar" societies, a district so deeply connected with the beginnings of cooperation in this Presidency. And if it is—like mother like daughter, like priest like people, we may expect to find other urban and rural societies very similar to the ones we have now visited.

We may close our Southern Division with mere figures; there are in all 9 urban and 28 rural societies: of the urban two are purely for weavers; of the rural two have included grain-dealing in their bye-laws. All the others are, more or less, what we may call normal.

We have only just enough time left to give a few figures, with a few remarks added, for our Northern and Central Divisions. Rather a large area to be disposed of so briefly!

Gujarat differs from the Karnatic possibly as much as one Presidency may differ from another. Yet there are more likenesses, perhaps, than differences; and our societies, being of so comprehensive a turn of mind, may bring out both sides. The constitution will be much the same in both, but the needs and the cost of money will vary. In Gujarat, on the whole, money seems more plentiful, and therefore cheaper: a society will, if one is not careful, go off with a flourish of rupees, and go on paying the interest thereon without investing any, or very much, of the amount it borrows: it will, as it were, tie up its capital in a *rumal*, put it at 3 (if it has enough energy for that) in the Post Office, and go on its way cheerfully or thoughtlessly, paying out 6 per cent. for that for which it is getting 3 per cent. *Cui bono*, and for how long? In other cases,

one may find a mixture, half the members mere depositors, the other half mere borrowers. Sometimes the moneyed constituents will not trust the poor. What is the solution that approves itself to us most? Let the two combine where they can ; but where they cannot let each party be content with its own society ; and let the society of rich depositors (or sharers) lend out to poor societies, near and far, such sums as they need and can pay for with their cooperative credit.

I would go beyond a society's immediate neighbourhood, and suggest that well-to-do Gujarat societies should lend money to their poverty-stricken sisters of the Deccan. Security may be found in plentitude by those who can see on the spot ; and they can convey their knowledge to the distant creditor. This has been done already by that philanthropic society, the Bombay Urban ; the Hon. Mr. Vithaldas Thackersey's society I call it. That society errs, perhaps, on the side of philanthropy. I do not say that others must do so, too, though following its lead. Let the societies be strictly business-like, and let their lending rate even be not too low. But let them lend, not merely talk about it. " Bombay Urban " has lent some Rs. 14,000 to rurals at a truly opportune time ; what we should have done without it I really do not know. I ask that in places where people have money they may cooperate in lending it : they may if they like, of course, do a little local business in big or small loans, fixed or current deposits, and may act in fact as a general Savings Bank, and lend out their resulting capital discriminately, on the advice of the Registrar or of anybody else they choose. I am not jealous ! When the Gujarati says, then, " I have money enough, I need no loan ; or if I need, I have a cheap market ready at hand," we may reply by showing how he can employ his money both kindly and profitably, and safely too, by joining it with that of others suffering from the same complaint to lend in lumps to like societies of unlike means.

I close Gujarat with a few figures. Like the Gadag Taluka (Dharwar) of the South with its nucleus, so we have the Prantij Taluka (Ahmedabad) of the North with its 8 societies, due, I believe, altogether or in great part to Mr. Bulakhidas, the then Mamlatdar, and to the aged Patil of Poglu. These two nuclei form nearly the extremes of the Presidency

proper, north and south. Mr. Lalubhai Samaldas, another name famous in the Bombay "cooperative" world, has stepped in conveniently in the north with loans, somewhat as Mr. Vithaldas Thackersey has with his Bombay society in the south. In all, Gujarat has 4 urban and 22 rural societies.

Lastly, the Deccan : we include in this, we may say, the very heart of the Presidency—and a good deal of its backbone, I aver. I am not an anatomist ! "Barsi Urban" I have alluded to, and Poona and Bombay have some seven societies between them. Manmad is the centre of a quasi-Railway society, catering mostly for the welfare of Railway servants. Its moral nature, too, may be seen in its title "All-India Brotherhood" Cooperative Society. They have essayed cooperative stores. Poona, and East and West Khandesh together have gained in importance (if possible) as the birthplace of societies established for the benefit of Government servants. The Saraswat Brahman Society (urban of course), with headquarters in Bombay, may serve as a good model for definite caste societies. We may allot in all some 10 urban societies to our Central Division. But the important question is the rural. Even the Deccan itself is not uniform. We may consider the Khandeshes, perhaps a country by themselves. "Bodwad Rural" shines brilliantly in the east, due much to my friend, Wajir Patil. But I have no time to dwell on the events of the society here. It has some Rs. 3,800 in deposits from members. We must postpone our visit to hospitable Bodwad.

Let us turn to the stern Deccan proper, the Nasik, Nagar, Poona, and Satara Districts. The three former are disposed of with one society, and that still undeveloped. For the Satara District, I can say much more than that ; but I will merely point out that my sojourn during the rains, after a somewhat exhausting tour and before the Annual Report, in Satara itself enabled the neighbourhood to pick up scraps of information and come and ask for more. The result has been a nucleus round Satara itself and spreading. The societies are all young and tender, and they need and will need careful nourishing with bread and milk, that is money and advice, for some time to come. The field is large, and abounding in debt, the people poor and ready, they will cooperate in small companies, they have a will to work, they have little or nothing to

deposit, they are honestest perhaps than other parts we have dealt with. What do they need ? Business capital to clear them from old debts, and then start them on new labour and improvement of their lands. To reverse these objects is to put the cart before the horse. We do not want them to pay off one debt and incur another to be treated with equal carelessness. Nor do we want them to learn to spend more on what is not profitable. To both these points small cooperative credit societies pay special attention ; so we want such societies, well founded, well supervised, and well treated by kindly capitalists, small or great, local or distant, treated, I say, with the means of subsistence and the means to progress. Their own deposits may follow later on. The Satara District has now some 13 societies : of these some are technically urban, being of small artisans or the like. But the movement is rural rather than urban, and I am hoping our big men of Satara city may be shamed into action by the efforts of the little villages dotted in and round the sluggish mass of urbanity. Two of my little societies are, as a matter of fact, actually in Satara city ; but they are not " Satara city." It is suggested that every city might have its lending society and savings bank. Post Office interest is small.

I close the Deccan with the statement that there are about 17 urban societies in all and about 11 rural.

To sum up, I may say that there are 30 urban societies and 61 rural altogether in the Presidency proper. For further figures, if required, I would refer inquirers to my Annual Report, just out, for the 15 months ending June 30th, 1907. I have arranged that the Secretary of the Conference have one copy with him for ready reference.

What do we need ? We need honorary organisers. I have three noble ones—Rao Bahadur Motilal Chunilal (Gujarat), and Messrs. K. N. Bhangaonkar (Khandesh), and A. B. Desai (Belgaum). I want one more at least for the Deccan proper. The more, if suitable, the better. The work is growing, and growing complex. In all, 91 societies exist now in the Presidency proper as against 31 reported at the end of the year closing March 31, 1906. You ask—how to begin ? Sit in the Chavdi, and tell them of Hulkoti, Bodwad, and Betgeri with their thousands.

We need capital. We ask either for individual lenders, such as Mr. Lalubhai Samaldas, Sir Cowasjee Jehangir, Mr. D. J. Tata, and Sir Sassoon David have been, to our immeasurable gain; or else, for lending societies like the "Bombay Urban" of the Hon. Mr. Vithaldas Thackersey, or like up-country urbans, provided they have the money to lend. We do not ask these latter to be as philanthropic as Bombay; nor do we ask all capitalists to be as philanthropic as Mr. Lalubhai; we ask for business loans on business terms, but with interest low enough to fit in with the needs of the locality. Up to now rates have ranged from 4 per cent. to 7 per cent. The first is obviously too low, the last for some a little high. Six and a quarter per cent. is a convenient rate all round, and a rate that enables redemption of old debts with creditable expedition. Once old debts are paid off, the Savkar may learn to invest his money in the local society, and draw his income or pension therefrom without trouble; while the ryot may learn to live within his means, that is within the good books of his society, and subjugate mother-earth to yield her fullest fruit and feed her happy children.

AGRICULTURAL DEVELOPMENT IN BOMBAY AND THE WORK OF THE DEPARTMENT OF AGRICULTURE.

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In an Industrial Conference like the present, concerned as it is with the development of every industry throughout the country, there is none which claims more attention and more thought than agriculture. It does this by virtue of its size, for it remains and will remain for many years, if not for ever, the premier industry of India. It claims attention also because of its essential importance, for on its success (as we know to our sorrow during these present months) depends not merely the development of the country but even the very existence of the people. It claims the best thought of India, too, because it is capable of improvement

in so many places and in so many ways. Such being the case, I have no hesitation in bringing before you to-day a little of the past history of the Agricultural Department in Bombay, and also something of the programme of experiment and effort which I hope will be carried out in this Presidency in the near future.

We are as most here well know, faced on this side of India with a variety of agricultural conditions almost without parallel in any province in the country. On the one hand, we have areas of as great rainfall as almost any in India ; on the other, we have areas of absolute desert. We have large districts with some of the deepest and best soil in the country, as, for instance, much of that round the very town in which we are met to-day ; but we have also districts containing chiefly bare upland soils in which the greatest efforts can only produce a minimum crop. We have on the one hand, agriculture of the very highest type, comparing well with the best and most intensive cultures of the west, such as I, myself, have seen within a few miles of our meeting place to-day, and on the other, we have the most primitive methods in vogue, capable, I am confident, even without any greater outlay of capital than at present, of being so improved as to give on the same land crops very much greater in amount and also in quality. It would, therefore, appear to be of exceeding advantage if it were possible to form a central body which could bring the better methods, already in use in some parts of the province, to the notice of the people and into their practice in another, and also which could at the same time discover improvements on any system at present in vogue, whether by importation of European methods, seeds, implements, or manures, or by working out what was needed locally on the spot where they are required.

Such a central body is the Department of Agriculture. It was founded in response to a recommendation of the Famine Commission of 1880 after the most severe famine from which Bombay had suffered for fifty years. During the twenty-five years which have succeeded its formation it cannot be said that the Department has wholly fulfilled its functions. No one looking back could consider it an

unqualified success. It has, except in one or two areas and in one or two subjects, failed to get into touch with the actual agriculturists in the field. It has not always succeeded in adapting its recommendations to special local conditions, and this has occasionally brought its suggestions into disrepute. Its experimental work, too, has often had only an exceedingly local application. But with all its drawbacks, it can look back on a very considerable amount of success. And when the indifference to development generally felt in its earlier days, both by Government and by private people, is taken into account, as well as the lack of a trained agricultural staff, its influence, and the benefit derived from its operations are probably much greater than might have been anticipated. The Bombay Department of Agriculture has had the huge advantage of the presence during a considerable part of this period, of one of the most practical agriculturists whom we have had in India,—I mean Mr. Mollison—who has now become Inspector-General of Agriculture for the whole country.

I might indicate to you a few of the lines in which successful work has been done. The most striking recent success, and one which if properly followed up, may lead to enormous consequences, has been the introduction of Egyptian cotton into Sind. As you know, Indian cotton, as a whole, is coarse and of short staple, at any rate when compared with the best of that produced elsewhere. Efforts, time and again, have been made to introduce better types of plant from America and other cotton growing countries, but on any large scale they have uniformly failed. A few plants have, however, often succeeded in establishing themselves, and after disappearing from notice for many years reappear as a new and good type of indigenous cotton. But no direct successful introduction of a long staple cotton had taken place until Egyptian cotton was brought to Sind about five years ago. The result of this introduction is known to many here. So far as growth and the maintenance of staple is concerned, there is no longer much doubt that the canal tracts of Sind are admirably suited to the growth of Egyptian cotton. Though there has been some difficulty with insect pests (and more particularly with the cotton bollworm) yet

there appear signs that this will be got in hand ; and what other obstacles still remain before Egyptian cotton is an established crop there, do not in the main concern its feasibility, but rather the character of the Sind cultivators and their methods, and the need for capital and skilled working of the lands.

So much for exotic cotton. But there appears to be a much greater field for carrying our best Indian types to areas where they are not known. The carrying of Broach cotton seed to certain parts of the Dharwar district in the south of the Presidency is an illustration of this, and it promises to be very successful. Considerable quantities of Broach seed, as a result, are now annually being taken to the new district, and it is well within the reach of probability that in the comparatively near future, that best indigenous cotton of India may be obtained in large quantities from Dharwar.

But an equally important result seems to have been obtained in the improvement of the Broach cotton itself on our experimental farm in the neighbourhood of Surat. Here, by carefully combining different strains of Broach cotton, a type has been produced which seems to be an improvement on that in general cultivation. After the next season, if all is well, a small quantity will be available for distribution to growers for experiment, and it is to be hoped that it will then fulfil all the promise which it gives.

It is well known that cotton, in any district, without selection, is bound to fall off in staple, and hence in value. Except in certain areas, such selection has not been carried out by the cultivators of the crop, and this is, perhaps, one of the causes of the general reputation that cotton has obtained of rapidly deteriorating in India. In recent years, with the extension of machine ginning, there has been another factor causing deterioration, in the inevitable mixing of varieties which takes place at the gin. The best cultivators, of course, retain enough cotton for seed and handling it at home : the best cultivators also have learnt to keep up their type by selection, but these are comparatively few. Instruction in the principles of selection of cotton for seed has been, hence, repeatedly given on our farms, and will be given often, if not regularly, in future. So it is hoped and

believed that we shall assist in securing the maintenance, if not the improvement, of the cotton staple and the yield of the crop.

The activity of the Department has not only been shown in connection with cotton. I feel that some of the most important results have been in the sugar-cane industry, especially in the Nira Canal District in the Deccan. Here, where the yield and quality of the sugar-cane is very high, Mr. Mollison was able to show how equal yields could be obtained by the use of cheaper and yet better manures, as by the substitution of safflower cake for more expensive cake manures, by the use of nightsoil obtained from Poona city, and by the use of less water and less manure of any sort than the cultivators were in the habit of applying. Not only this, but having found a particularly good iron mill in use in the Poona District, its employment was spread throughout the country, while the efficient method of preparing gur from the sugar-cane juice in use at the same spot has been demonstrated by expert sugar-makers in a number of parts of the Presidency.

Previous to the experiments of the Department there was a prejudice against using sewage as a manure for sugar-cane. Now it has been proved to give excellent results both as regards purity and yield of sugar. At present there are not many sewage or sewage-effluent farms in India, but, as they extend, the fact that first class sugar-cane can without doubt be grown on them is a fact of primary importance.

Turning to other crops, it may fairly be claimed that improved varieties of wheat, showing greater resistance to disease (rust) have been spread over the wheat-growing parts of Bombay: that similar work has been done for tur, one of the principal pulse crops of the Presidency; while with ground-nuts not only have varieties yielding more nuts and richer nuts been introduced, but others also adapted for growing in districts where the late or early rainfall is not completely certain.

One of the most valuable pieces of work the Department has ever done was the saving of perhaps the most valuable breeds of Gujarati cattle, the *Kankreji* breed—in the famine of 1899-1900. This was essentially Mr. Mollison's work,

done, I believe, with the help of many private gentlemen, of whom Lord Northcote was the leader, and now the Chharodi cattle-farm founded for this purpose, has become a centre for producing and spreading the bulls of this breed. At the same time the initiative has been taken, on this side of India at any rate, in the production of essentially good milking breeds of cows. Some of these have been developed, and bulls of these breeds are also being spread over the country where a call for them has occurred, and in as great number as is yet available.

I am not sure whether to the Department, or to Mr. Mollison in particular, is not due in part the development of the now large dairying industry in Baroda and Gujarat. Now, as is well known, the bulk of the cream used in Bombay and from which Bombay butter is made, is separated in Gujarat, and then sent daily by a long railway journey to the capital. This is an industry capable of immense improvement and great development, and every effort will be given to bringing this about.

Such is a rapid survey of some of the salient points in agricultural development in which the Department of Agriculture has had a hand, and in most instances a predominating hand. It may be said that the improvements are small compared with the money and energy expended. I confess it. But the future promises much greater things. There is now a staff more highly trained than ever before and constantly increasing, a Government fully alive to the importance of the work, and a better knowledge of what is needed by those who cultivate the land.

In the near future the work which has been so successful in the past will by no means be laid aside. The improvement of seed, of cotton, wheat, *tur*, millets, and the like, will still be one of the chief and most valuable lines of work. The difficulty that the poverty of many of the *raiya*s is such as not to allow them to select their own seed will have to be met. How this will be done I do not yet know, but something will most certainly be done. Closely allied to the production of improved varieties by selection is their introduction from abroad, as well as that of new crops, and to

these matters a good deal of attention will be given in the coming years.

To me personally the most vital question in the agriculture of the Bombay Presidency, and one which forces itself particularly on the attention in this famine year, is the economy of water in and on land. It is valuable to extend irrigation canals and systems,—perhaps the most valuable work that has been done in India for forty years. But, so far as it goes, it is equally if not more valuable if one can increase say by ten, twenty, or even possibly by thirty per cent. the land which any particular canal can irrigate. Can this be done? At present I hardly care to express an opinion. But I will say that there are a good many facts, which lead me to the conclusion that it is not altogether beyond the reach of possibility. At any rate we are going to make experiments on the subject, and if we can only succeed in extending the area which is secure from drought by a small amount the Department of Agriculture will have justified its existence over and over again. Side by side with this question lies another,—the retention of the small quantities of rainfall in the soil so as to make irrigation unnecessary, or, if not unnecessary, to make less irrigation suffice. Some success has been obtained in this line in America, and there seems at least a possibility of doing the same in many of our agricultural tracts. At any rate we are going to do our best to find out how most effectively to take advantage of the small quantity of rain that falls.

Another matter of importance is the question of the rotation of crops. There is an extraordinary unity in the way in which the same crops are grown after one another in most parts of western India. There are endless variations which might be introduced, and it may be that our investigations will lead to the discovery of alterations which will prove of exceeding benefit.

With regard to insect pests, I must own that our Department has been able to do comparatively little. The locust has continued unchecked or nearly so; the cotton bollworm, it seems possible, may now be treated with some effect; the sugar-cane borer—source of endless damage—has been beyond our skill. But all these are under close

study here or by Mr. Lefroy at Pusa, and it is not beyond probability even, that these and other equally serious pests may be made to yield. We have several men in the department whose knowledge of, and experience in economic entomology is considerable, and any method, which promised at all well, will you may be sure, not be neglected.

We intend, too, to cautiously introduce and recommend the use of artificial manures. Hitherto these have not been economical. Value for value, local oilcakes and similar manures have been far cheaper. But as the price of these is continually on the rise, it will not be long before the use of artificial manures will probably pay, more especially as in all probability they will, in many cases, decrease rather than increase in price. Sulphate of Ammonia, one of the most important of them, will shortly be a local product: crude saltpetre is already cheap enough to compete with local materials, and others can and will be tried, and if advisable recommended. In the meantime tests are being made on a number of our experimental farms, so that we shall be able to recommend the best not only for each soil but for each rotation of crops.

The question of improved implements is another of vital importance, and in no connection more than in that of raising water. Extensive experiments in the use of oil engines are being carried out in Madras of the results of which we shall make full use both for demonstration, and further experiment. Improvements in instruments for actually working the land are slowly spreading as it is and their spread will be encouraged and recommended.

Such are the more important parts of our experimental programme, that is to say our programme so far as search for better crops, better methods, better manures, and better implements is concerned. "But when all these are found," I am asked, "how do you bring these to the knowledge and to the door of the cultivating *raiya*." It is here, I own, that agricultural departments almost all over India, (and not in India alone) have failed almost more than in anything else. They have been getting results which have been pigeon-holed instead of being brought into practice; and this has certainly in a measure happened in Bombay. I

feel it is a case of overcoming this difficulty, or, as a department, failing abjectly to fulfil our proper sphere.

Hence an enormous amount of attention has been given lately to devising methods for meeting the actual condition of things. As a result a number of methods have been inaugurated of which I, perhaps, may now give you a short sketch.

First and foremost, there has been initiated, and in a measure developed a College of Agriculture at Poona, in which the highest and best training in scientific agriculture that we know how to give will be provided. No expense has been spared in the building or equipment, and I am ambitious that the course there given will ultimately be equal to that at an English or European University. Speaking as Principal, I may say that I shall be satisfied with no less. Thus we shall be able to send out, either as Government servants in the agricultural or other departments, or as workers on or managers of their own lands, a body of men who will be apostles of a better agriculture, to every corner of the country. Already a considerable number of men of just the type we want are coming to the college,—men who after their course will be able to command respect as agriculturists wherever they may go,—and these will gradually increase in number as the years go by.

Second only to this in importance, and perhaps in its own way quite as important, will be the short courses for agriculturists for instruction in specific improvements in the local agriculture, to be held at the many local farms of the Department. These farms are scattered all over the country. There are two in Gujarat, two in the Deccan, one in Khandesh, one in the Southern Mahratta country, and one in Sind. Already we give training in seed selection. I believe training in the near future may be given in better methods of dairying in Gujarat: in protecting wheat and millets from smut at Dharwar, &c., and so on. These short courses for training in special points will be continued and extended,—I think with every prospect of advantage.

For this purpose we are developing a class of men who are to be known as Divisional Inspectors. These men are agriculturists by birth and training, they will be selected

from the senior men among our best college students, and they will be able to carry out the courses at the experimental farms. They will, in addition, go round the country in their division, and become, if possible, the confidants of the *raiya*s, and not being connected with any revenue department they will probably be able to do so. Thus they will from *taluka* to *taluka*, be able to bring suggestions to the doors of the cultivators themselves. They will have power to suggest modifications of practice to *raiya*s, and offer to supply seed or manures or lend implements where the demonstration of a new variety, a new manure, or a new implement would be of advantage.

Wherever possible such a man would work through a local agricultural association, formed in the village or *taluka* which he visits. Such local agricultural associations are still few in number, but are growing fast. They form another bond between the Department and the cultivators. They give the first news of a plant disease or an insect pest, and indicate that they want help. They select the best men to whom new seed, new manures, or new implements are sent for demonstration. They are the body to whom agricultural information is sent, whether published in the form of leaflets or through the vernacular agricultural press. They organise local shows to which the Department lend every assistance, and generally form a centre for the improvement of agriculture. To such associations the Department will be of every help it possibly can.

I have just spoken of local shows. These have been held in a few places, but will probably be developed to a considerable extent, through the working of local agricultural associations. On a larger scale every support will be given to great exhibitions, such as that held in Bombay three years ago to which selected cultivators were taken from all parts of the Presidency, and all the new crops, implements, and so on, on view there were explained to them, with, from all I have heard, immense advantage. For the discussion of the larger problems of agriculture, and also of the work done by the Department, annual or biennial conferences are to be held in some large centre in future years. The last took place in Ahmedabad only a few weeks ago,

Nearly all those most interested in agricultural development in the province attended, and to me, at any rate, the Conference has given valuable ideas, and an impetus in the work I have undertaken in Bombay that can hardly be measured.

Such are the methods at present in operation and in view. They are no doubt inadequate, and still a gap remains which time and enthusiasm and energy and cooperation only can fill up. But the idea that pervades the Department now, I believe, and which must pervade it, if it is to be of the use we want it to be, is that it succeeds just in so far as, and no more than the agriculture of the presidency is improved. Of all things I do not want it to be thought of as a Government institution standing apart from the people. We want it to be useful, and, in my own mind, only by its usefulness can the expense, the energy, and the time required for maintaining the Department be justified.

Gentlemen, before I sit down there are two more points on which I insist. The first is that I insist on the essential aim of the Department of Agriculture in Bombay. We do not want for a day to be considered as Government institutions. We exist simply and solely to benefit the cultivator of the Presidency. (Applause.) I want to leave Bombay to-morrow if I find that I cannot do something to help the province. (Hear, hear.) I do want to insist on that with all the earnestness that I have. The position that I take up is that I am here simply and solely to be of use, and I believe that in saying that I speak for every member of the Department to which I have the honour to belong. I have one more suggestion to offer, and that is, that the Agricultural Department have a farm here, and if any of you, gentlemen, would like to go round that farm, I will be glad to take you round, and show that farm. (*Loud cheers.*)

THE DESIRABILITY OF COMMENCING AGRICULTURAL EXHIBITIONS IN THE BOMBAY PRESIDENCY, ESPECIALLY AT SURAT AND POONA.

By STANLY REED, ESQ., *Editor, The "Times of India,"*
Bombay.

Mr. President and Gentlemen,—Two years ago it was my good fortune to pass through the principal of the Punjab Irrigation Colonies, and to be able to see something of the revolution wrought by the hydraulic engineers, which has enabled the once desolate *bar* to support the most prosperous peasantry in the world. Riding from Lyallpur to one of the typical villages on the Chenab, my attention was arrested, on the outskirts of the town, by a series of mud structures, bearing a faint likeness to grand-stands and judges' boxes dotting the wide maidan. In response to my inquiries, I was informed that this was the site of the annual agricultural show, which was one of the great annual festivals of the neighbourhood, and which brought the peasantry in their thousands, with exhibits in large numbers and of all classes, in friendly rivalry once a year. This unexpected spectacle caused some little heartburning to one who believes that the Bombay Presidency is the salt of India, and should lead it in every important development. The Punjab peasantry are grand men; but as cultivators they are surpassed by our Kaira ryots, and the very astute farmers of Mahim. In the Punjab they are laying the foundations of a scientific agricultural staff on generous and well-considered lines. But in this respect they are a score of years behind the Bombay Presidency, where the exhaustive study of Indian agricultural conditions was commenced by Mr. Ozanne two decades ago. In these circumstances, is it not a reproach to us that in parts of the Punjab, they should be able to organise on a considerable scale that invaluable means of linking science to practice—the agricultural show—whilst we are still discussing how to commence the formation of agricultural societies?

No one acquainted with the conditions of rural England, and especially with the West of England, can fail to be

struck with the enormous influence exercised by agricultural societies, and especially by their principal outward expressions, agricultural shows, upon the improvement of English agriculture. Of recent years a revolution has been wrought in the conditions of life in the English countryside. By the adoption of intensive cultivation, scientific stock-breeding, and the substitution of dairying for unprofitable corn-raising, prosperity has been made to smile over wide areas formerly smitten with disastrous depression. In the revolution the agricultural society, and especially the agricultural show, has been the determining factor, for there is no other agency so fruitful of educative influences. In this Presidency we have an Agricultural Department, ably though inadequately staffed, burning with the desire to accomplish practical work. The results of its irrigation are just coming into sight. The introduction of long-stapled cotton into Sind promises to buttress still more firmly our spinning and weaving industry. The hybrid between the Broach and Deccan cottons, if established, will give an immense stimulus to the Indian cotton production. In various other directions the scientific experts are pressing forward towards knowledge which will remove many of the most grievous burdens under which Indian agriculture labours. On the other hand, we have a peasant population full of inherited lore, and anxious, according to general testimony, to learn about agricultural developments. But between the expert on the one hand and the cultivator on the other, there is practically no link. It would be scarcely an exaggeration to say that the experimental farm and the scientific expert mean no more to the great mass of the land-owning and cultivating classes of this Presidency than the laboratory and the alchemist did to the Middle Ages.

This it seems to me is the weakest spot in the agency set up to improve the standard of our oldest and most important industry. If the country is to derive an adequate return for the considerable sums which Government is wisely spending on the scientific study of agriculture, it is a gulf which must be speedily bridged. Government may do much. It may provide demonstration farms and itinerant demonstrators and lecturers : it may furnish a constant stream of

agricultural knowledge through the publication of leaflets and the dissemination of news, in popular form, through the English and vernacular press: it may encourage certain forms of agricultural education. But the main impetus must come from outside the machinery of Government: it must, as it has been in almost every other part of the world, be unofficial in character.

It is not my purpose to discuss in any detail the precise form, which the necessary agricultural associations should take. At the recent conference at Ahmedabad a decided preference was expressed for village, or at the most taluka associations. I would only say that this is one of those questions where it is desirable to hasten slowly, and if it be agreed that a start should be made with village societies, those villages should be selected where the cooperative credit movement has taken the firmest root. But whether village, taluka, or district associations be accepted as the most promising, it will be necessary, in favourable localities, to focus our efforts, if the societies are to materialise into agricultural shows, without which they must be shorn of most of their value. It seems to me that there are certain centres clearly marked out for our earliest efforts in this direction. They are here, at Surat, where the Government Experimental Farm forms an admirable centre round which an agricultural exhibition could be arranged: Poona, where the farms at Kirkee and Manjri offer facilities no less favourable: Dharwar, where the experimental farm is newer, but is making great progress. No less desirable is it to join, at any rate at first, these exhibitions with occasions which bring men of all classes together. Those of us who have followed the instructive debates at the recent agricultural conference at Ahmedabad will lament the fact that they did not take place in a showyard displaying the best which agricultural Gujarat can produce, and the most promising results which the Government experts have to show. How much more educative this conference would be if we could walk from this *pandal* to a collection of the products of Surat and Broach, and follow practical demonstrations illustrating the course of agricultural progress. Let us proceed with our village and taluka associations by all means where the

ground is favourable ; but let us simultaneously organise, at Surat and Poona to commence with, associations whose principal business it shall be to focus diffused effort into annual exhibitions, made as attractive as possible, where the progress of agriculture can be brought home to the landowner and the ryot with a force and directness which all other means cannot equal.

Gentlemen, it will not be necessary to bespeak for any such movement the support of Government. At Ahmedabad Dr. Harold Mann expressed his opinion that not nearly enough use was made of the agricultural show. We may confidently rely upon the Agricultural Department for financial help, and for expert advice and assistance. We may turn to the railway companies for cheap fares. Not the least of the advantages offered by Surat and Poona for this purpose is that both are within easy reach of Bombay, and are convenient railway centres. We may ask Government, in the early stages of the movement, to assist still further by bearing the cost of bringing picked ryots from a distance to the site of the show. But if the movement is to have life and durability, the burden and heat of the day must be borne by non-officials. I can imagine few works, which should appeal more strongly to the patriotic Bombayite of all classes. A blessing was of old called down upon him who made two blades of grass grow where one grew before. We can, everyone of us, earn a share of that blessing by helping to bring home to the hereditary and patient farmers of Western India, the scientific knowledge which will enable them to double the scanty produce of their fields.

LIFT IRRIGATION.

By ALFRED CHATTERTON, Esq.,

Director of Technical and Industrial Enquiries, Madras.

My object in presenting this paper to the Industrial Conference is to draw attention to the advance which has recently been made in the Madras Presidency in the scientific study of subterranean water and well irrigation, and to place at the disposal of those interested in the improvement

of the agriculture of India, the information which has been gathered in the Irrigation Pumping Department during the four years it has been at work.

Although wells and subterranean water are worthy of the attention of engineers it is a matter of regret that in India they have been very much neglected in the past and that the cultivators have been left almost entirely to their own resources. In 1882 Captain Olibborn, who was afterwards Principal of the Roorkee Engineering College, submitted a long report on well irrigation in the North-West Provinces and Oudh, arriving at the result that "well irrigation is only profitable under favourable conditions, and that there is reason to believe that in most districts cultivators have already very fully availed themselves of their opportunities." In Bombay, Mr. F. D. Campbell, an Executive Engineer of the Public Works Department of that Presidency, spent some months on special duty, and as the final result of his enquiries formulated the opinion that "nothing can be done to introduce new or cheaper systems of well construction or of lifts than those which the ryot is already familiar with." Much later, in 1896, in a report on water-lifts recording the results of some experiments on the efficiency of various systems of water-lifting, I wrote: "Steam-pumping machinery is utterly beyond the means of the ryots, and the force of the wind is too uncertain, and in general in India it is too weak to be profitably utilised by wind-mills even of the most modern type. Animals are, therefore, the only source of power available, and water-lifts in the future must continue to be, as they always have been, worked by cattle. Moreover, the Indian agricultural population are so singularly devoid of even the most rudimentary mechanical skill, that it is absolutely necessary that machines intended for their use should be designed to work without complicated gearing of any kind."

At that time it seemed as though the last word had been said on the subject of well irrigation, as all the attempts to improve on indigeneous methods of lifting water had led to no decisive results, and the engineers who tackled the problem retired baffled by the difficulty of providing a water-lift of superior efficiency to the native water-

lifts without incurring too great an initial outlay and without forcing the cultivator to use a machine too complex for his comprehension, and beyond the resources of the ordinary village artisans when it needed repair. Further, the opinion was generally held throughout the Madras Presidency that few wells could be found which would yield sufficient water to keep even small pumps of modern construction at work for a sufficient time to make it worth while to instal them. It was assumed that the cultivator must keep his bullocks for agricultural work and that in their off-time they could be employed working mhots on the wells and that such work practically cost nothing.

In 1900 in an article on "Underground water-supply" I wrote: "Underground water has never in India been studied properly by engineers or geologists and wells are sunk in a happy-go-lucky manner to a haphazard depth. They are constructed with primitive appliances, and at small cost. Expectations are not usually great, and as they are generally realised the people are content. The depth of the well is limited by the fact that the primitive methods of sinking in vogue among the ryots prevent them going more than a few feet below the hot weather level of the water. With an engine and pump to keep the well dry much greater depths might be attained and possibly the supply of water enormously increased." And again in 1902 in an article on "Well Irrigation" the following passage occurs: "In the South of India well sinking is a very primitive business, and the better the supply of water, generally the shallower the well. A ryot wants a well and having selected a spot which he thinks suitable he sets to work and either sinks a hollow cylinder of brickwork into the ground till water in sufficient quantity to satisfy his expectations is reached, or he excavates a big rectangular hole in the disintegrated rock which forms the sub-soil and goes on deepening it till the inflow of water is greater than can be dealt with by the modest water-lifting appliances at his disposal. Year after year, in the hot weather when the water-level is low, he may increase the depth by adding to the number of mhots on the well, and in this way many valuable water-yielding wells have

been sunk. Let us suppose, however, that the unwatering of the well in the hot weather is accomplished by a powerful engine and pump, the work of excavating will be easy, and the depth may be rapidly increased till either the inflow is greater than can be dealt with or practical considerations indicate that it is not worth while to go any deeper."

These remarks were consequent upon experience with the working of oil engines. For small powers they had been found to be inexpensive reliable motors that required no great amount of skill to run them. Even with kerosine oil as the fuel it was obviously practicable to employ them for lifting water under favourable conditions, but when later on it was found that there was no difficulty in using the much cheaper liquid fuel which is imported into India, the possibilities of their employment were vastly increased. It was not very difficult to convince the Government of Madras, in the Irrigation Department that experiments in this direction were well worth trying, and that in fact the time had arrived when the question of well irrigation might again be taken up with some prospect of doing useful work, and of evolving means of making much greater use for irrigation purposes of subterranean water than had been previously possible. Moreover increased experience in the management of indigenous industrial work had led me to think that the mechanical inaptitude of the people of this country can be cured, if proper means for training them are provided.

One of the causes of the poverty of the people of India is the little use they make of mechanical appliances, and efforts should be made to effect a change in this direction. The great rise in the price of food-stuffs, accompanied as it is by an equivalent or even greater rise in the wages of the labouring classes, has brought many of the wealthier agriculturists to a similar conclusion, and it is certain that in the next few years a great advance will be made by the substitution of oil and gas engines for bullock-power in many of the processes for preparing agricultural produce for the market. It is necessary that this opinion should gain ground, and be more widely accepted, and that mechanical engineers should be induced to devote their ingenuity and

skill to providing simple machines capable of being driven by engines of a few horse-power, for such operations as extracting oil from seeds, the juice from the sugar-cane, hulling paddy or grinding wheat. It is true that most of these operations can be carried out in an extremely satisfactory manner, if the scale of working is only sufficiently large, but the day for big enterprises of this kind has not yet arrived, and for the present it is desirable to provide special machinery which can be worked on a small scale, and which can be purchased and set in operation with the comparatively small amount of capital which as yet is available among individuals. Cooperative enterprise is still a thing of the future, and till that is realized our efforts must be directed to providing for the small capitalist.

It is true that there are many machines for doing this kind of work already on the market, but save in the case of sugar mills I do not think that any of them are quite satisfactory, and their use is not extending as rapidly as would be the case if they were better adapted to the work they have to perform. Fortunately for lifting-water the centrifugal pump is almost ideally suited to the work which it has to perform. Its first cost is small, it is extremely simple and fairly efficient, and combined with the oil-engine there is likely to be a wide field for its employment in this country.

It must not, however, be imagined that the oil-engine and centrifugal pump will replace to any appreciable extent the indigenous methods of lifting water. According to the latest returns (for the year 1905-1906) there are in the ryotwari tracts of the Madras Presidency upwards of 628,400 wells in good working order, and a further 61,000 out of repair. The number in the zamindaries is not known, but the total for the whole province may well be over three-quarters of a million. To lift water from these wells either the picottah or the country mhote is used, the number of special forms of water-lift being absolutely insignificant. Only a small percentage of these wells yield water sufficient to keep more than a single mhote or a single picottah at work. Not that many of them could not be made to yield a much larger supply of water, but the owners either have not enough

land to use the water on, or are too poor to provide the labour necessary to lift the water.

The idea is generally prevalent that native methods of lifting water are extremely cheap since the cattle must be kept under any circumstances, but careful investigation shows that it is only true within certain limits, and those limits have already been reached. Well cultivation is carried on to the utmost extent possible under the existing conditions, and if any great extension is to take place in the immediate future, it must be by supplying the ryots with additional power for lifting water. At the same time the cost of that power must be very much less than that they now pay for any work done in the way of lifting water which is beyond the capacity of the cattle they keep for general agricultural purposes.

It is, therefore, a most important matter that we should endeavour to ascertain the actual cost of lifting water by native methods, and at the outset it may be conceded that within the limits already referred to the ryot can lift water fairly cheaply. The question is what he will have to pay, and what he does pay, for lifting water when cattle have to be kept specially for work, or when he has to hire cattle. Five and twenty years ago at the Agricultural College Farm, Saidapet, Mr. Benson, as the result of long and careful trials, came to the conclusion that the cost of keeping a pair of good cattle amounted to 12 annas per day, and that they were capable of lifting 240 cubic feet of water to a height of 25 feet for 8 hours a day. Or in other words 4,000 cubic feet of water could be raised one foot for one anna, or an acre inch of water could be raised 25 feet for Re. 1-6-8. In the last 25 years rates have risen very considerably, and the cost of lifting water has increased, so that under the conditions of Mr. Benson's estimate it is hardly likely that 3,000 cubic feet can now be raised one foot for one anna.

Simple as the problem may seem, it is extremely difficult to find out how much work is done by a pair of cattle under normal conditions. Any attempt at an experiment interferes with the normal conditions, the efficiency is temporarily increased, and better results are obtained

than are possible without some kind of special supervision. Two years ago I made some enquiries in the Chingleput District, and I found that a fair day's work for a single mhone was as follows :

On a lift of 20 feet, using a bucket holding 20 gallons of water, 30 lifts per hour would be made for 9 hours a day. The minimum cost of keeping the cattle was Rs. 15 a month and the usual rate for hiring them was Re. 1 per day. Taking the minimum figure this works out at 2,160 cubic feet lifted one foot for one anna. These figures are corroborated by some data collected by the late Mr. H. A. Moss, who was Executive Engineer in the same district. In a report on "Wells and Well Irrigation in the Chingleput District" he states :

"Water is usually raised by picottah, when the lift is 15 feet and under, when more bullock mhones are used. The cost of raising water for about 6 to 10 feet is about 4 pies per thousand cubic feet per one foot lift. From 10 to 15 feet, the cost comes to about 5 pies and from 15 to 20 feet it is about 6 pies per thousand cubic feet per one foot lift."

The Chingleput District is in no way exceptional, and the figures obtained will more or less apply to the rest of the country. Any great exactitude is impossible, but it will not be far from the truth, then, to put the cost of lifting water either by means of the picottah or the mhone at one anna for every 2,000 cubic feet lifted one foot. Under favourable conditions, and with water-lifts specially adapted to the work, better results than this can be obtained. For instance in South Arcot, where there is an abundant water-supply at about 15 feet below the surface of the ground, double mhones worked with a rotary whim are largely in use, and are very much more efficient than the ordinary water-lift in other parts of the country. It is not, however, with the extremely favourable cases that we have to deal. If lift irrigation is to be extended largely the conditions will generally be more difficult to deal with than has hitherto been the case, and the means provided must be capable of working under a fairly wide range of conditions.

During the last four years through the agency of the Irrigation Pumping Department, we have been gradually introducing the use of oil-engines and pumps for irrigation work, and have tried them under a great variety of condi-

tions, many of them being extremely unfavourable and none of them ideal. I do not propose to burden this paper with technical details as evidence regarding the statements which will be made is furnished in full, in the various official reports which, from time to time, are issued by the Department. In an appendix to this paper is given a complete list of such reports.

Oil-engines and pumps are only economical, and their employment, therefore, can only be recommended when the quantity of water to be dealt with is fairly large. If a well yield a thousand cubic feet a day, it will give ample employment for a mhoite, but to make it worth while to instal an engine and pump the yield should be not less than 10,000 cubic feet a day for the greater part of the year. It is true that engines and pumps are working, and working at a profit, where the supply falls below this limit, but the circumstances are more or less special, and it is doubtful if they could be repeated indefinitely. The following figures taken from the Administration Report of this year show what has actually been the cost of working at a number of installations :—

				Number of cubic feet of water lifted one foot for one anna.	
				1906-07.	1905-06.
Melrosapuram	...	...	...	3,900	...
Kadiampatti	...	...	...	4,013	6,400
Villupuram	...	...	...	3,230	5,800
Cuddalore	...	...	...	9,370	6,750
Saidapet	...	...	...	8,300	4,126
Katalai	...	...	...	...	6,500
Bezwada	...	...	...	3,340	3,200

In the report for last year it was shown that under very favourable conditions a small oil-engine and pump, dealing with 216,000 gallons of water per day on a lift of 25 feet, could raise 13,500 cubic feet one foot for one anna. This may be considered a maximum, seldom if ever attained under actual working conditions. The figures given in the table fall very far short of the ideal, but the worst are as good as the best that can be obtained from cattle-power, and the

best show that water can be lifted at from one-third to one-fourth the cost of doing it by cattle. The larger the scale of pumping operations, the more cheaply can each unit of work be done whilst the indigenous methods of lifting water are only applicable on a very small scale, and would utterly break down, if any attempt were made to use them for lifting large quantities of water.

In the report by Mr. Moss already alluded to, some information is given regarding the duty of water. He says :

"The cost of irrigating paddy from wells alone is expensive, especially when the rainfall is at all deficient. On the other hand the return per acre from well-irrigated paddy is much more than from that irrigated by tanks and channels. It is generally half as much again, and may be even twice as much. Six months' paddy usually requires 40 waterings of about 2,000 cubic feet per acre. The cost from a well about 15 feet deep may be taken at one rupee per watering. If the land is far from the well it will be more, owing to the loss by absorption. If the rainfall is bad, 60 waterings would be required, and the outturn without the rain is always deficient. As the water in the well will be low the return to the ryot is very small, and paddy is not worth cultivating under such circumstances.

"Four months' paddy requires usually 30 waterings at a cost of about Rs. 30. The cost of watering is less than that for 6 months' paddy, but the return in grain is less."

The average area irrigated by a well is about three acres and as paddy requires more water than any other crop grown under wells, it is obvious that the average yield of the wells is less than that which can be deduced from observations on paddy cultivation. Taking Mr. Moss's figures we find that 1,333 cubic feet of water per day are required for three acres of paddy. It is, therefore, probable that the average yield of the wells in this Presidency is not more than 1,000 cubic feet per day, and in many cases it is certainly less than this. In the large irrigation systems where the distribution of water is under proper control, the duty of water is from 90 to 100 acres per cubic foot per second; that is to say, a continuous flow of one cubic foot per second will irrigate from 90 to 100 acres of land. The water used by the ryot yields a duty of 195 acres or practically twice as much, and this is probably the best result that can be obtained as we may be fairly certain that the accumulated experience of many generations of paddy growers instinctively prevents the Indian cultivator from using too much

water. In the note on "Irrigation by pumping from a well at Melrosapuram" published as an Agricultural Bulletin, the data collected at that station are furnished which corroborate this estimate. The high figures at Melrosapuram are largely due to the use of masonry channels for conveying the water from the well to the field. Even to the ryot the loss of water by soakage from his channels is a serious matter, though the land to be irrigated is close to the well. To the man who uses an oil-engine and pump it is still more important as the length of channel is much greater, and generally it may be assumed that the larger the irrigation system, and the greater the area deriving its water from one source of supply, the larger will be the percentage lost from the canals, and the distributaries themselves.

a. The cost of lifting water for irrigation by mechanical means depends very largely upon the continuity of the supply and the number of days during the year on which water is supplied. Interest and depreciation bulk very largely in the total cost of running the plant, and an economical result can only be obtained, when the percentage of working hours is large. The ryot in one way or another pays from Rs. 5 to Rs. 8 a month for the irrigation of an acre of land. In most cases this heavy charge is not seriously felt, as it is met by the utilisation of what would otherwise be bye-products, but as soon as these bye-products are exhausted the full cost is felt, and the ryot realises that it is impossible to grow the ordinary crops at a profit. With oil-engines and pumps the cost of irrigation varies considerably, and for small schemes of from 20 to 40 acres, it may be taken that the irrigation will cost from Re. 1-8-0 to Rs. 3 per month. The larger the scheme the lower the cost of irrigation will be, the best result being that which will probably be obtained in the Divi Island Pumping scheme where 50,000 acres of land are to be irrigated and where the water may have to be lifted to a maximum height of 10 feet. It is estimated that the working expenses will not amount to more than Rs. 2 per acre for the season or an average of about 8 annas per acre per month. As a lift irrigation scheme the Divi Pumping Project is exceptional in regard to the size of the plant and the extent of the area irrigated, but in many places along the coast similar schemes

of a smaller character are practicable, and where the lift does not exceed 10 or 12 feet paddy cultivation may be carried on profitably. For the most part, however, pumping will not be under such favourable conditions; the lift will usually be greater, the supply irregular, and the plant much smaller. Even if paddy cultivation pays, there is no reason why it should be encouraged, as other and more valuable crops can equally well be grown. People who have the enterprise to instal engines and pumps generally take a great deal of interest in the cultivation under them, and as usually they have some command of capital, the tendency is to go in for intense cultivation and to grow crops which yield a very much larger profit per acre than can possibly be obtained when the common food-grains are cultivated. So far sugarcane, plantains and ground-nuts have yielded the best results, but large profits are also made in the cultivation of tobacco, turmeric and the ordinary garden crops. A supply of water which can be relied upon all the year round is practically wasted, if it is not utilized for crops which require water the whole year through. These are the crops which yield the largest return to the cultivator, partly because the extent to which they can be grown is limited, and partly because their cultivation necessitates the possession of a considerable amount of capital. With a perennial supply of water under engines and pumps the gross return from the cultivated area ought to be never less than Rs. 100 an acre, and it often amounts to two or three-times this sum.

When the Experimental Pumping Department was first started the impression generally prevailed among those who are best acquainted with the agricultural conditions of the country that the scope for its operations would be extremely limited, because of the difficulty of finding sites where a sufficient water-supply could be obtained combined with landholders in the neighbourhood, who would have sufficient capital to avail themselves of it. The fact that there are now about 100 pumping plants at work in the Madras Presidency is evidence that there is a much wider field for their employment than was anticipated, and the investigations which have been carried on, before installing these plants, have put us in

possession of a large amount of information of a most satisfactory character. Certainly there will be absolutely no difficulty whatever in irrigating hundreds of thousands of acres by engines and pumps if only the capital required to lift the water can be found, and the ryots can be taught to make use of the water in a proper way.

The great obstacles to progress are the poverty of the people, and the extraordinarily minute way in which the land is sub-divided. The smallest area which can be profitably cultivated by an engine and pump is from 15 to 20 acres, and the number of such holdings in one block is small. Still there are a sufficiently large number to enable a great deal of work to be done in exploiting this method of lifting water, and long before the possibilities of large holdings are exhausted, the owners of smaller holdings will perceive the advantage of combining together and by cooperation securing to themselves the benefits consequent upon this cheap method of lifting water. I do not think it is any exaggeration to say that the oil-engine and pump will prove, and in fact are proving, extremely potent agents in the development of the material resources of the country. Already in some of the rural tracts the ryots are familiar with them, recognise their merits, and regard them as desirable things to possess; whilst those who have got them have been led to take a much deeper interest in agriculture than they did before, and being intelligent men with capital, their farms are becoming the centres for the diffusion of improved agricultural practices throughout the country. I am in hopes that in the course of a year or two it may be possible to form an Agricultural Association every member of which will be the user of an oil-engine and pump, the main object of the Association being to encourage the extension of the use of such methods of lifting water and to supply the members with information which will enable them to make the best possible use of the water at their command. So far Agricultural Associations in this country are an exotic growth and without official support few of them would be in existence. The Association I am contemplating will stand on a different footing; its members will all be agriculturists operating on a fairly

large scale, and keen to make the most of the capital they have put into their land.

The supplies of water sufficiently large to give employment for engines and pumps are mainly to be found in the Coast districts, and along the margins of some of the big rivers. In such districts as Coimbatore, where well cultivation has reached its highest development on indigenous lines, there are apparently not many places where wells can be sunk which will yield sufficient water to give employment to an engine and pump. Here and there there is one, but certainly not one in a hundred of the 75,000 wells in the district could furnish enough water to make it worth while to put in an oil-engine and pump. On the other hand, in South Arcot, Chingleput and North Arcot abundant evidence has been obtained that over very considerable tracts of country the ordinary native wells can easily be improved so as to yield enormously greater supplies of water than have hitherto been drawn from them. In these districts the water mainly occurs in vast beds of coarse sand which form subterranean reservoirs of considerable, but as yet quite unknown extent. In some cases the sand is covered by a comparatively thin layer of alluvial deposit, and the water can be found by sinking wells from 15 to 20 feet deep. In other cases the sand lies at a considerably greater depth, and is overlaid by impervious beds of clay which have to be pierced to get at the water. In the South Arcot district between Pondicherry and Cuddalore these beds are more than 200 feet below the surface of the ground, but the water is under pressure sufficient to force it up the boreholes, and form true artesian wells. To the North of Madras similar sand beds are found at a much smaller depth, but the pressure is not sufficient to constitute true artesian wells, and the water has to be lifted in some way or other. Some 30 or 40 boreholes have been put down in the bottom of existing wells, and have successfully tapped the sub-artesian water-supply. Most of the pipes are of 4" diameter, and the yield of the water varies from 50 to 200 gallons per minute. It is probable that in most cases a much larger flow could be obtained by either inserting a pipe of larger diameter or by deepening the well, and lifting the water from a lower

level so as to diminish the pressure against which the water is forced up from below. In one case two 7" pipes have been put down, and the yield of water is over 500 gallons a minute which is lifted out of the well by a 12 H. P. engine driving at 6" centrifugal pump. In nearly every case these improved wells will yield sufficient water to justify the installation of engines and pumps, but as yet the people are too poor and too dubious about the continuance of the flow of water to do anything in this direction. In a year or two they will be in a better position to realize the value of the water beneath their lands, and may then be anxious to avail themselves of any means whereby they can secure to a larger extent of land an unfailing supply of water.

*In the tract of country to the south of Pondicherry many hundreds of boreholes have been put down, and the water-supply derived from the artesian beds is very considerable, and it is not improbable that to the north of Madras the development of sub-artesian water will be found to be of similar extent. In other places there is reason to suppose similar water-bearing deposits exist, but as yet they have not been explored, and their capacity is entirely unknown. Where the water-bearing sands occur nearer the surface, and where the surface slope of the country is considerable, they have been drained to some extent by 'spring heads' or *kasam*. These consist of a pond often of considerable size which has been excavated till the water-bearing sands are reached. From the pond a deep channel with a small bed-fall leads the water out on to the lower lands. This channel is generally a mile or two long, and a good deal of the water drained from the pond must be lost on its way to the land. The supply in the pond is apparently maintained by percolation from the beds of sand which lie at a higher level. The sand in these *kasams* is usually very coarse, and the flow of water apparently very free. As a rule in the hot weather they dry up altogether, or the water has to be lifted out of them by baling with picottahs or mhotes. Unquestionably the installation of engines and pumps would enable a very much larger body of sand to be drained of water, and it is probable that in most cases a perennial sup-

ply of water could be obtained in place of the present supply which is only sufficient for a single crop.

Where the slope of the country is small it is obvious that irrigation by *kasams* is impracticable, but very extensive beds of coarse sand exist and have been tapped and tested in many places and at no very great cost, it is practicable to put in wells which will yield from 200 to 300 gallons of water per minute. A considerable number of these have already been sunk, and there is no doubt that they will steadily increase in number. It is impossible to say what area of land is underlaid by these water-bearing sands in the Madras Presidency, but it certainly runs into thousands of square miles, and there is probably water sufficient for the irrigation of several hundred thousand acres. The withdrawal of large quantities of water will lower the level at which it is found, but there is fair ground for assuming that most of these sand deposits are in direct connection with the main drainage lines of the country and every fresh which passes down an adjoining river will tend to restore the original water level.

There does not seem to be much hope that deep-seated artesian water-supplies will prove of value for irrigation. In the Gōdāvari district artesian water has been tapped in several places, by mining prospectors in the Polavaram Zamindari, by the Madras Railway at Ellore and by various people in the neighbourhood of Samalkota and Cocanada. At Ellore a borehole was put down to a depth of 430 feet and cost nearly Rs. 13,000, whilst the yield of water does not appear to have been much more than about 3,000 gallons per hour. Further details regarding the cost of artesian wells will be found in a note by Mr. E. W. Stoney, C.I.E., in the November number of the *Indian Engineer*.

The sandy beds of most of our rivers are probably the next most important source of water-supply and one which, as yet, has been but little made use of. The indigenous method of getting at the water is extremely ingenious, but it involves the expenditure of a very large amount of labour. Channels or ditches are dug in the beds of the rivers with a bedfall considerably less than that of the river. In the upper part of the channel the water from the sur-

rounding sand drains into the channel, flows down it and is carried away through a cut in the river bank. In some districts "doruvu" wells are employed to some extent. They are wells sunk in or close to the river bank and derive their water-supply from the sand. Apparently the engineering work involved is beyond the ordinary ryot and such wells are not popular. Where they exist they require study and where they do not exist it is desirable to encourage them as much as possible.

It has always been assumed in the past that there was a slow flow of water beneath the sand in the river-beds, and it was tacitly accepted that the spring channels probably drew off most of the available water, as no large supply could ever be obtained at any one point. A careful review of the evidence furnished by the partial failure of several attempts to get at the water in the sandy beds of these rivers, led to an examination of the conditions under which spring channels work, and it was then found that the prevailing ideas were erroneous, and that there is no flow of water in the sand of a river-bed except between pool and pool, where the slope of the water plane in the sand may be very steep. Below a certain level the sand in the beds of rivers is saturated with water which remains motionless unless a local hydraulic gradient is established sufficiently steep to cause the water to flow. I do not propose to go into the evidence upon which these conclusions have been based, as it has already been published in this year's report. Every cubic foot of sand below the saturation level contains rather more than 2 gallons of water, so that a square mile of sand 10 feet deep is a reservoir containing over 550 million gallons of water, or sufficient for the irrigation of a thousand acres of land. Allowing for the fact that the sand in the river-beds is not always 10 feet deep and that it is impossible to extract all the water from the sand, but without taking into account any water 20 feet below the level of the saturation line, it is quite certain that for every square mile of river-bed we might have an equivalent of a square mile of irrigation. The problem which remains unsolved is how to get at this vast quantity of water. In this matter our experience is gradually increasing and one certain con-

clusion is that owing to the resistance which the sand offers to the motion of water it is impossible, except at great expense, to collect any large quantity of water at one point. On the Hagari river we found it a simple matter to obtain 150 gallons a minute, and for a moderate outlay * we are drawing 750 gallons a minute from the riverbed, but to obtain more water than this at our pumping station seems likely to prove a difficult matter. By sinking wells in the river-beds, it is found that in most cases a comparatively small well will yield 300 or 400 gallons of water per minute, so that, if a large quantity of water is to be withdrawn, a large number of wells should be sunk at a sufficient distance apart to prevent one well materially interfering with another. In many cases these wells can be sunk inside the river bank, in others quite close to the bank, and when this is practicable the pumping work may be done by power distributed electrically. To get at the water in the middle of the river-bed when the bed is very wide is a much more difficult matter, and may be considered for the present outside the range of practical engineering.

All the experience we have gathered so far points to the fact that with brick wells from 12 to 15 feet in diameter we can get enough water to supply a 4" centrifugal pump with a depression of the water surface of 3 or 4 feet. Some day I think there will be a chain of such wells extending along both banks of most of our rivers and at intervals of about 10 miles there will be electric generating stations supplying current to electro-motors to drive these pumps.

The perennial flow of most of our rivers is already diverted by means of anicuts which in the upper reaches of the river, where the bed is rocky, are often very numerous. Still there are a few cases where the water-supply is wasted by being allowed to flow into the sandy expanses in the lower reaches of the rivers and the remedy is obviously to instal engines and pumps. Of installations of this kind there are already one or two at work, and there would be more if permission to pumps could be obtained.

On the West Coast in Cochin and Travancore there are extensive tracts of irrigated land formed by bounding off

* Rs. 2,300.

the backwaters and draining them. The system of irrigation is of great antiquity, but of late years it has been modified by the introduction of pumping machinery, and there are a large number of steam and oil engines now employed in draining these lands. A great deal of enterprise has been exhibited in this work but not much engineering skill, and unquestionably the Kōle cultivation, as it is called, could be enormously improved by combining irrigation with drainage and by putting the operations in each section under one control.

In some of the swamps along the coast and in lakes like the Kolair, between the Kistna and Gōdāvari rivers, there is a considerable body of fresh water which only requires to be lifted a few feet to render it available for the irrigation of the neighbouring lands. Years ago in the Kolair Lake and in the Lankas bordering on the Upputeru river such cultivation was established under steam pumps and proved moderately remunerative, but gradually interest in the matter died out and the pumping stations were abandoned. The successful working of the oil engines has revived interest in the matter, and pumping has recommenced and may possibly be largely resorted to.

In connection with the development of this modern phase of lift irrigation, the improvement of existing wells is a matter of great importance, and if only a small percentage are found suitable for working with oil engines and pumps, the absolute number will be large, and they may become important inasmuch as they will often occur in those tracts of country which are most liable to be affected by the vicissitudes of the seasons. Owners of wells have generally some vague idea of the quantity of water they will yield, but they have very little notion as to the quantity of water which a 3" centrifugal pump will lift, and it frequently happens they want to set up pumps when the water-supply is quite inadequate. The most satisfactory way of investigating cases like this is to first of all ascertain the yield of the existing well towards the end of the hot weather and to put down an exploratory borehole to determine the nature of the surrounding rock. The borehole will generally furnish sufficient evidence to enable an opinion to be formed as to

whether it is worth while to deepen the well. Sometimes the borehole taps fissures carrying water under pressure and materially increases the flow into the well ; sometimes it reveals beds of porous rock which only require opening out to yield a copious supply of water. Where the rock is hard and the water is mainly found in fissures, the explosion of a charge of dynamite at the bottom of the borehole will sometimes materially improve the supply. As yet we have done very little work in this direction, but I am not without hopes from the experience already gained, that when wells can be sunk to a much greater depth than has hitherto been the native practice, it will be found that the inflow will in many cases justify resorting to pumping machinery. Where we can keep our engines fully employed, which means wherever we can command from 150 to 200 thousand gallons of water per day, the depth from which it can be lifted before this becomes an unprofitable operation is much greater than is the case in ordinary well irrigation. With this the limit is about 40 feet, whilst 150 feet will probably be found practicable with oil engines and pumps. It is not so much the height to which the water has to be lifted, as the risking of a large capital outlay in what must of necessity always be an uncertain undertaking, which makes it at present doubtful whether sinking wells to any very great depth is to be encouraged. In some cases we have found that a very slight addition to the depth of a well enormously increases the inflow, and it is just at this point that native well sinkers have to stop, as the unwatering of the well becomes an exceedingly difficult operation when only mhotes or picottals can be employed. Where the water is contained in sand it is not difficult to frame an estimate of the cost of getting at a certain quantity of the water, and we do so by putting down an exploratory borehole to ascertain the thickness of the deposit of sand, which sand is itself examined to determine the size of the grains of which it is composed, but with wells sunk in rock we are in no such satisfactory position. We have but little more knowledge, and much less experience than the professional well-sinkers of the country, and we shall have to make many experiments before we can teach the people of this country

anything. To this end we have recently ordered a portable petrol-pumping plant which can easily be carried about and can be put down any well and used either for baling during construction work or for observations on the rate of inflow. The Government of Madras have also sanctioned a sufficient sum of money for a systematic series of tests as to the advantage or otherwise of torpedoing boreholes sunk in hard rock. Our progress with wells of this type is not likely to be very rapid, unless we can secure the interest and co-operation of the more intelligent men who are interested in the improvement of water-supplies for irrigation. Throughout the country there is doubtless a good deal of empirical information the collection and study of which would be of value. It would help us to make a better start, but I do not think it will carry us very far on our way, as the water-supplies which we are searching for must lie at a much greater depth than is within the range of indigenous experience, and to make them available we require an enormously greater supply of power than has ever been at the disposal of the owners of wells in the past.

The financial aspects of this method of lift irrigation have already been dealt with to some extent when we were discussing the relative cost of lifting water by the old and by the new methods, because in the figures given for the new methods a full and proper allowance has been made for interest and depreciation on the capital outlay involved in setting up a plant. In an appendix to this paper will be found figures giving the actual cost of a number of installations which have been set up. The cost per acre to be ultimately brought under irrigation varies considerably. It may be as low as Rs. 50 an acre or as much as Rs. 200 an acre, but obviously for high class cultivation, where the yield per annum may be valued at Rs. 400 or Rs. 500 an acre, it may pay very well to expend a great deal more than Rs. 200 per acre to get a good supply of water. In the Deccan, under some canals near Poona as much as Rs. 50 per acre is the water-rate on land growing sugarcane, and in this Presidency many gardens and plantations could easily stand a water-rate of a similar amount. It would

have afforded me very great satisfaction to have presented accurate figures regarding the working expenses and returns on a number of farms where this new system of lift irrigation prevails, but no one cares to furnish them. There is, however, ample evidence that it is very profitable, and the best indication that it is appreciated is to be found in the fact that the rate of increase in the number of installations is greatest in those places where the number is already largest or where they have been longest at work. In ordinary years and under normal conditions, given a sufficient water-supply, there should be no difficulty in turning it to very profitable account, but often with oil-engines and pumps the greatest profit will be made in years when the season is unfavourable, scarcity prevalent and prices high.

In many cases oil-engines and pumps may be used to supplement other sources of supply and convert agriculture of an uncertain type into one of great certainty. One of the earliest installations in this Presidency was erected on the banks of the Cauvery, from which river the water-supply to the pump is derived. The lands ordinarily depend upon channels from the river for irrigation water, but this is extremely uncertain, and partial or total failure of the crops occurred at such frequent intervals that the owners of the land derived nothing from it and the ryots who cultivated it earned a precarious livelihood. Over a tract of 300 acres a 12" pump has completely changed this. The natural water-supply may fail, but the pump is there to take its place, and the whole area can be converted to perennial irrigation. The owner reports that during the last eighteen months 55 acres have been under plantain cultivation, and have yielded a gross return of over Rs. 400 per acre, or about one and-a-half times the whole of the capital outlay on the pumping plant. In a good year the return from paddy cultivation would have been about Rs. 50 per acre and the net profit very small. Under plantains the net profit on the 55 acres must have been sufficient to pay 50 per cent. on the initial expenditure. The area under perennial irrigation, such as plantains or sugarcane, would have been much larger, but it is restricted to 60⁷/₈ acres at this place by the Revenue authorities lest the water-

supply to lands lower down the river should be interfered with.

From the figures given in the appendix it will be seen that the minimum cost of a pumping installation is about Rs. 2,000, and the actual out-of-pocket working expenses, being the necessary expenses for fuel, lubricating oil, stores and repairs, will be about Rs. 50 a month. The installation of engines and pumps is, therefore, a financial operation of considerable magnitude even with comparatively wealthy ryots. Very few, if any, have sufficient ready money, and a certain number of installations have been paid for by loans under the Agricultural Land Improvement Loans Act, such loans being usually repayable in twelve annual instalments. This method of financing these pumping schemes would be entirely satisfactory were it not for the difficulty which the borrowers experience in finding the necessary security. My experience is that the majority of loans applied for are rejected for this reason, and it may possibly be desirable in the future to amend the Act so as to provide greater facilities for obtaining loans for the purchase of engines and pumps. If the machinery could be taken into account when assessing the value of the security for the loan, there would be no difficulty and loans would be freely applied for. Greater success has attended the sale of engines and pumps under the hire-purchase system which has been worked out by Messrs. Massey & Co. Under this method the would-be owner of the pump has to pay one-fourth of the money down and the balance in instalments, generally extending over two or three years, during which time he has to pay 8 per cent. interest on the balance debited to him. He is thus able to get his engine and pump for a comparatively small initial outlay and to pay the balance out of profits accruing from the use of the pump. So far the system of working has proved satisfactory, and it is probable that it will be resorted to very largely in the future when it becomes more generally recognised that irrigation under oil-engines and pumps can be made a very profitable business. The hire-purchase system is a very vicious one when applied to afford facilities for the purchase of unproductive goods by those who not afford them, but it has distinct merits

in some cases, and is an extremely simple method of financing small industrial undertakings, as it provides the small capitalist with ready means to obtain money or the equivalent of money on fairly easy terms. It is possible that a great deal more might be done in this way if Government took the matter up, purchased the engines and pumps themselves, and sold them on easier terms than private firms can do. The risk of loss will be very small, as the engines and pumps would remain the property of Government till they are fully paid for, and they would never be sold except for use under conditions which will have to be investigated by the expert officers of Government and reported as satisfactory.

The number of oil-engines in use in this Presidency for minor industrial undertakings as well as for lifting water is growing rapidly, and there has naturally sprung up a rather keen demand for men capable of driving the engines. The extreme simplicity of the oil-engine renders it possible to train fitters to look after them in a few days, and there has never been any great difficulty about getting drivers; but a good fitter is rather wasted when put to drive a small oil-engine, and his pay adds quite unnecessarily to the working expenses. In Madras we have started a school for Oil-engine Drivers, where practical instruction is given in the driving of various kinds of oil-engines and the pupils are put through an elementary course of fitting so as to enable them to take the engine to pieces, clean them and fit them together again. Anything more than this it is not considered necessary that a driver should know. If the engine really gets out of order it is better that it should be overhauled by a skilled mechanic, and the driver in charge of it should be nothing more than a driver. A good many people who have bought engines have sent their men or servants to this school to be trained, and after a course of instruction lasting from three to six months they are generally found quite capable of looking after the engine. In this way Oil-engine Drivers can be provided at a cost no greater to the owner than if he had to provide a man to look after a pair of bullocks. With large engines the saving in this direction is not a matter of much impor-

tance, but with small plants the fact that local men could be trained to do all the work that is necessary has tended much to increase the popularity of these engines. The Engine Driving school was originally started in the School of Arts, but it has now been taken over by, and forms part of, the Chengalroya Naicker's Technical Institute. The class is popular, as the men who pass through it can always obtain work.

The fact that large monetary transactions are involved wherever oil-engines and pumps are set up and where the fuel for working them has to be purchased and paid for in cash has in a remarkable way led to a more definite appreciation of the monetary value of irrigation. This is still more emphasized by the rise in the price of food stuffs and the tendency to pay farm labourers in cash instead of in kind. The farm is no longer so self-contained as it was, the working of it necessitates transactions outside the village, and the crops have to be selected by the ryots not merely with a view to their own internal requirements and to meet the demands of Government and the District Board, but also to meet the charges connected with the working of the engine. Outside markets have to be studied to a greater extent than formerly, and the cultivator is brought into more intimate contact with the outside world. Of course the movement is a very small one at present, but the tendency is one in the right direction, and should ultimately conduce to the development and education of the agricultural community.

In the South Arcot District, where more pumps have been fitted up than in any other part of the country and where nearly all the wells have an unfailing supply of water, the owners of pumping plants are beginning to raise water and sell it to their neighbours when they do not want it themselves. At the Panampet pumping station which was leased to Messrs. Parry & Co. two systems of selling water were tried. Ground-nut crops were irrigated at Rs. 5 per acre per month, and for other crops the whole supply of the pump was sold to any ryot who wanted water at a fixed rate per hour. This practice is very largely in vogue in the Western States of America, where water for irrigation is a vital necessity, and if it is once recognised in this coun-

try that water is a commodity which can be bought and sold, it will probably greatly simplify some of the problems connected with the development of this kind of irrigation. Where the water-supply is very abundant and where the ryots have no capital and the land is sub-divided into small plots, it might be practicable to establish local water-supply companies who would raise water and sell it to the ryots either for a share in the produce of the land, or for a fixed rate per unit of volume or a fixed charge per acre irrigated. If anything of this kind is to be brought about, it will probably be necessary for Government to pioneer the way, and to provide sufficient legal protection to induce capital to flow in this direction.

It must be recognised that only in a few places will it be possible to pump large quantities of water from a single source of supply. The wells must be numerous, and it will probably be found most economical to have a single power-generating station and to distribute the power electrically, driving centrifugal pumps with electro-motors. Large power-stations are much more economical than small ones, and it is quite possible to put in motors and pumps that require no more supervision than that a man should go round and oil them once a day. Such water-supply corporations exist in America and have worked successfully for years past, and it is quite certain that there are no engineering difficulties worth speaking of. On the other hand in India it will require an immense amount of tact and patience to get the advantages of such a system acknowledged. To make it profitable intensive cultivation must be adopted, and even if the capital is forthcoming to enable this to be carried on, it is doubtful if the ryots possess the requisite experience to make it a success. After studying the question of the better utilisation of subterranean water for but a very short time I am convinced that there are no serious difficulties from the engineer's point of view, either as to a sufficiency of supply or as to the cost of raising it above the ground so as to make it available. On the other hand the practical administrator, who would like to make use of this water and apply it to the land so that the people may be placed in a position which will enable them to carry on their agricultural work with

a fair amount of certainty, will find the achievement of his wishes a task of extreme difficulty.

The purchase of land is a favourite form of investment in this country and the line of least resistance seems to lie in the direction of encouraging people who have amassed wealth to purchase land which is capable of improvement and to reserve a considerable amount of their capital for the improvement of the land they have purchased. Money invested in land yields a very poor return, but, judiciously invested in the improvement of land, the results are likely to be much more profitable and the value of the land permanently increased. The work which is being done in this direction by men like Mr. Gopinatha Tawker at Surapet, Mr. Tota Ramanujam Chetty at Katalai, Mr. Panduranga Mudaliar at Cuddalore, Mr. Tilla Govinda Gramani at Nelikuppam, Mr. Abraham Pandithar at Tanjore, and by many others, is pioneer work of the utmost public value and deserves recognition at the hands of their fellow-countrymen.

Irrigation by pumping is still in its infancy, but the success which has already attended the earlier installations renders it certain that it will grow rapidly and there is a vast field for it in Southern India. What has been accomplished so far is the direct result of the modern developments of the internal combustion engine in its various forms, and there is reasonable ground for hoping that further improvements may be effected in the future rendering motive power cheaper and pumping appliances more effective.

APPENDIX I.

List of Papers on Subjects connected with Lift Irrigation.

1. Construction of Wells for Irrigation in the North-West Provinces.—Captain CLIBBORN, B.Sc.
2. Note on the Construction of Wells on the Awa Estate.—W. J. WILSON. (*Department of Agriculture and Commerce, North-West Provinces and Oudh.*)
3. A Note on Trials of an Aërmotor in Well Irrigation.—W. H. MORELAND. (*Bulletin No. 11 of 1900—Department of Land Records and Agriculture, North-West Provinces and Oudh.*)
4. Hydraulic Experiments in the Kistna Delta.—ALFRED CHATTERTON. (*Professional Papers No. 2, College of Engineering, Madras.*)
5. Experiments with Water Lifts.—ALFRED CHATTERTON. (*Bulletin No. 32.*)
6. Water Lifts.—ALFRED CHATTERTON. (*Bulletin No. 35.*)
7. Note on Irrigation by Pumping from a Well at Melrosapuram.—ALFRED CHATTERTON. (*Bulletin No. 55.—Department of Land Records and Agriculture, Madras, Agricultural Branch.*)
8. The Value of Wind-mills in India.—ALFRED CHATTERTON.
9. Lift Irrigation (pp. xi-240).—ALFRED CHATTERTON. (*G. A. Natesan & Co., Madras.*)
10. Report on Industrial and Agricultural Development.—ALFRED CHATTERTON. (*Government of Madras (Revenue) G.O., No. 393 of 5th May 1905.*)
11. Manual of Irrigation Wells.—E. A. MOLONY. (*Bulletin No. 22—(Department of Land Records and Agriculture, United Provinces.)*)
12. Report on Experiments with Oil-engines and Centrifugal Pumps in 1905-1906.—ALFRED CHATTERTON.
13. Report of the Experimental Pumping Department in 1906-1907.—ALFRED CHATTERTON.
14. Report on the Trials of M.R. Ry Rao Bahadur C. K. Subba Rao's Improved Water lift.—W. H. JAMES. (*Proceedings of the Board of Revenue, No. 386 of 18th October 1906.*)
15. Report on the Operations of the Department of Agriculture, Madras Presidency, 1905-1906.
16. Report on the Operations of the Department of Agriculture, Madras Presidency, 1906-1907.

APPENDIX II.

Actual Cost of Installations under the Sub-heads.

Serial Number.	Name of Station.	Engine.			Pump.			Storage of oil.	Foundations.	Engine shed.	Bellng.	Miscellaneous in- cluding circulat- ing cistern and fitting charges.	Total.
		B.H.P.	Cost of engne.	Cost of fitting.	Size of pump.	Cost of pump.	Cost of fitting.						
1	Kuhoor ...	5½	965	150	3"	285	93	30	40	30	50	82	1,725
2	Unjalur ...	5	1,286	77	3"	270	145	20	50	35	31	86	2,000
3	Thimmanacharikuppam	5	1,272	42	3"	270	103	20	70	30	31	82	1,920
4	Tanjore...	5	1,286	180	3"	800	76	30	110	35	20	103	2,140
5	Pagalpatti	7½	1,472	108	3"	285	90	30	60	35	30	105	2,215
6	Dorigallu	7½	1,420	82	3"	300	145	30	50	150	43	110	2,330
7	Thirukkarugavoor	7½	1,597	77	4"	365	135	30	50	150	40	121	2,565
8	Bangalaputhur...	7½	1,546	101	4"	345	165	30	50	150	35	118	2,430
9	Ranayyapattam	7½	1,546	91	4"	315	127	30	150	35	57	119	2,470
10	Nellikuppam	9	1,794	93	4"	365	128	30	80	50	40	130	2,710
11	Pallavaram	14	2,474	189	5"	450	...	30	80	200	81	175	3,670
12	Laccavaram	14	2,240	318	6"	385	243	60	100	200	81	183	3,810
13	Katalai ...	25	4,423	730	12"	1,265	445	160	200	750	123	404	8,490
14	Hagari ...	28	4,800	755	10"	1,100	411	150	250	1,000	100	429	8,995

CULTIVATION OF COTTON IN INDIA.

By G. A. GAMMIE., Esq.,

Economic Botanist, Bombay, Kirkee.

History of Cotton.—The fibre which furnishes the staple article of clothing in India is scarcely mentioned in the early literature of the East, but this may be explained by the contemptuous indifference evinced by learned men to the products and necessities of every-day life.

The Sanskrit word translated "cotton" is first mentioned in the Institutes of Manu, where it is enjoined that the sacred thread of a Brahmin must be made from cotton.

Herodotus gives a clear description of the cotton plant, when he says that the wild trees of India bear wool like sheep and the Indians use cloth made from these trees. Theophrastus describes a plant with a leaf like that of a black mulberry, the whole plant resembling the wild rose, and being grown in rows in the fields.

The first mention of cotton as an article of foreign trade is by Arrian, who flourished in the first century. He says that the Arabs exported cotton to the Red Sea.

From India the cultivation of cotton seems to have been spread westward as far as Southern Europe.

Cotton seems to have remained unknown in China until the 13th century. As the cottons of this country approach closely in appearance to those of Bengal and Burma, it is probable that they, with tea, were introduced from India.

In the New World, where varieties of cotton distinct from those of India are produced, the product must have been used from the earliest times. The knowledge of spinning and weaving gradually extended westwards and reached England in the 17th century.

In the early years of the last century the production of cotton in the Southern States of America was enormously increased, and this rise in importance of America as a formidable competitor induced the Directors of the Honourable East India Company to initiate the experiments for the purpose of improving the quality and quantity of Indian cotton for export to England.

EXPERIMENTS TO IMPROVE INDIAN COTTONS.

The causes of the decline in the appreciation of Indian cottons in the European markets have been often explained.

As regards the intrinsic value of the staple, the superior kinds of Indian cottons compared favourably, on the whole, with the American short-stapled cottons. The average staple of Upland Georgian is between 1'00 and 1'02 inch, that of the best Broach from '90 to barely one inch. The circumstances which tend to increase the inferiority of Indian cottons are carelessness in picking, which causes a loss of 2'5 to about 7 per cent, against under 2 per cent. of the American Upland Georgian. It must be remembered that the friability of the leaves of the Indian cotton plant is due to the drought of the picking season, so that, even with extreme care, it will never be quite possible to pick Indian cotton in a perfectly clear state.

Owing to the stronger attachment of fibre to the seed, Indian cotton is more liable to be injured in ginning than that of America and Egypt. The tenacious adherence of the fibre to the seed of course spoils the cotton in two ways, by the liability of the fibre to be cut and torn and by the breaking or crushing of the seed from which oil exudes to stain the fibre. The high pressure to which cotton is often subjected in baling is said also to be detrimental to the quality of the fibre.

According to Watson, the native varieties of cotton may be divided into two principal groups; the North-Western, yielding about one-third of its weight clear cotton and including the Broach, Dhollera, Bhaonagar, Old Khandesh (*Varadi*) and the *Fari* variety of Umravati cotton; and the South-Eastern group, yielding about a quarter of its weight of clear cotton and including the Hinganghat, the Bani variety of Umravati cotton, the Kumpta, Madras (Upum variety) and the new Khandesh cotton (from Hinganghat seed). The short-stapled Sind cotton, yielding rather more than a third of its weight of clean cotton, may be considered as forming a group apart. The varieties under the names of Western and Tinnevely cotton must have been yielded by the Bourbon variety, which has been acclimatized in the Madras Presidency since the beginning of the last century.

The four varieties which in point of quality proved

superior to all the others were the Hinganghat, Broach, Kumpta, and the Dharwar American cotton. The varieties next in order are the Khandesh, Western, Dhollera, Umravati and Madras cotton, whilst the Sind cotton must be placed last of all.

The principal descriptions of Indian cottons according to Beaufort are :—Hinganghat (Central Provinces), Broach (Southern Guzerat), Dhollera, Bhaonagar (Northern Guzerat), Kathiawar, Cutch), Umravati (Berar, Khandesh, Deccan), Kumpta and Dharwar (Southern Mahratta country), Sind (Sind), Bengal (Central India, Punjab, United Provinces), Bengal Westerns (Sholapur and northern part of Madras). Salems (Salem and Coimbatore), Cocanadas (Kistna, Nellore, Godavari), Tinnies or Tinnevellys (Tinnevely, Madras, Trichinopoly).

Two factors of inferiority in Indian cottons are staple and yield, and many experiments have been attempted with the express object of increasing the value of these.

The most obvious and speediest solution of the difficulty, namely, the introduction of higher class American or Egyptian, was suggested at first, but long experience has shown that, except in some particularly favoured districts, no advantage whatever is gained from efforts in this direction.

Recent experiments point out that successful results will ultimately be arrived at by the exceedingly slow but certain methods of selection. Theoretically no practical difficulties are anticipated in the establishment of farms to produce seeds of improved varieties in moderately large quantities, but the maintenance of these varieties when they perhaps cover large areas in cotton districts is a subject which has not yet been sufficiently discussed in all its bearings. Loyal cooperation on the part of cultivators and merchants will be necessary for many years to come. It is impossible for the members of a small Department to control arrangements beyond a certain point.

It must not be supposed that the cultivator himself is not fully alive to the importance of seed selection. Many farmers hand gin the seed required for the following year's crop; some in suitable parts of the Dharwar District already find it to their advantage to introduce seed of a superior variety from

Broach, others particularly reserve the green seed of Dharwar American, and in Khandesh the coarsest varieties are deliberately selected on account of their hardness, productivity and higher percentage of cotton.

Taking into consideration the want of capital and the average small holding of the Indian farmer any method of cultivation which would entail expenditure on artificial or farm yard manures is at present out of the question. The general consensus of opinion of the expert cotton growers who conducted experiments in the Cotton Department appeared to be that no improvement was to be expected from any alteration in the native methods of cultivating cotton as the implements already used were extremely well adapted to the purpose. The defects complained of, as has already been shown, were due to faulty processes during and after harvesting the produce.

The experiments, however, in these early years were directed with the purpose of introducing the finer exotic varieties into the country. This object was only attained by the establishment of the Upland Georgian into the Dharwar district and of Bourbon into parts of Madras. The sum of experience gained amounted to the fact that experiments with foreign cottons were often successful when conducted as costly garden trials while, on transfer to the fields it was found the plants would grow so moderately as not to afford a reasonable profit to the cultivator. Further, the foreign cottons with naked seeds fell an easier prey to harmful insects than the native varieties which, with one exception, have their seeds guarded by a dense covering of short hairs.

The universal result of the experiments may be summed up in the words of the report issued on those at Broach. "Some kinds of exotic cotton, such as the New Orleans and Bourbon, yielded occasionally a small crop when cultivated as garden plants with great care and expense, but they never escaped partial damage from the effect of the seasons. When the same kinds were cultivated on a larger scale, even with the greater skill, labour and care of the experimental establishments, the crop invariably failed. The possibility of raising garden samples of any kind of cotton, anywhere, by unlimited care and expenditure, is scarcely doubted, but the feasibility

of doing so upon terms within the reach of the ryot and with in the actual market value of the article has not been demonstrated at Broach. It was proved that, by double the care and attention and more than double the expense of the native cultivation, a larger yield and better and cleaner quality might be obtained from the indigenous cotton than the ryots can produce, but not sufficiently so to repay the additional outlay.

This may be considered the final word on the subject until the various Agricultural Departments in India again took it under consideration. They have profited by the lesson that little can be gained by the introduction of foreign cottons which have to be subjected to a long course of acclimatization. The failure of tree cottons on a large scale, after their success has been completely established in garden trials, has been repeated, and the inevitable result should now be accepted as a fact so that further loss can be avoided in the future.

The pursuance of a rigid system of selection on a scientific basis and the more intelligent appreciation of the laws which govern the production of crosses and hybrids will probably lead to definite results, at first on the seed farms and afterwards on the fields. New varieties will be introduced into districts suitable in every way to their individual requirements of climate and general environment. The Agricultural Department can furnish the necessary scientific guidance, but nothing can be done on a field scale without the assistance of the farmer and trader.

COTTON SOILS AND CULTURE.

Black soils in India are pre-eminently the best for cotton. Red soils are scarcely ever used for this crop. The superiority of the black soil is probably due to its depth and adhesiveness, which render it very retentive of moisture.

Mr. Mercer made the following remarks regarding the state of native cotton culture :—"In Guzerat, Khandesh, Southern Maratha Country and Berar, I find an approach to the American mode of culture, by sowing in drills and at regular intervals, while in Madras, the North-West Provinces and almost every other part of India where cotton is grown, the broadcast system alone is used. The first, by allowing the crops to be kept from grass and weeds, by means of the

plough or cultivator and the ground about the plants being thoroughly and constantly stirred, gives an advantage both in regard to cheapness and the improvement of plants themselves that the other never can possess and is, indeed, the chief excellency of the American mode of culture and the only one of its features which has been found not to need much modification.

“It appears that the natives of large tracts, as Guzerat, Berar, already employ a mode of cultivating the cotton plant, in principle nearly the same as the American, but better suited in some respects to locality, &c. No people better understand the advantages of rotation of crops than do the natives of India generally. With regard to implements of cultivation, those now in use amongst the natives of the districts where the drill system of cotton culture is practised are quite sufficient, being fully adapted to the most thorough tilling of the ground. Though the field for improvement is great, still the manner of growing the cotton is not nearly so defective as it has heretofore been the practice to represent.”

Previous experiments carefully conducted proved that irrigation, especially in the later stages, is harmful to the crop and weakens the fibre.

In conclusion, at the present juncture we are only in a position to say tentatively, exotic cottons can only be cultivated in favoured parts of India ; tree cotton cultivation is not worth the risk ; varieties can only be improved in their own localities, by the adoption of methods of selection and crossing, and that varieties can only be maintained in a pure state in the fields if the cultivators and traders are willing to observe the needful precaution.

COTTON CULTIVATION IN THE CENTRAL PROVINCES AND BERAR.

By D. CLOUSTON, Esq., M. A., B. Sc.,

Deputy Director of Agriculture, C. P., Nagpur.

The area under cotton cultivation in these Provinces has increased from 1,837,767 acres in 1866 to 5,821,041 acres in

1907. It now occupies a larger area than any other crop, rice being second in importance with an area of about $4\frac{1}{4}$ million acres. The great increase in material prosperity that is everywhere evident in the cotton-growing districts of these Provinces is largely due to their extension of cotton cultivation. This extension is directly due to the rise in prices, coupled with seasons of light rainfall favourable to cotton, which has resulted in making cotton more profitable than wheat, linseed, gram, sesamum and other minor crops which it has replaced. In Berar, where about 44 per cent. of the cropped area is already under cotton, and where the demand for fodder crops is very great owing to the very limited area available for grazing, the area under cotton has possibly almost reached its maximum. In the Central Provinces, on the other hand, there is still considerable room for expansion both in the present cotton-growing districts, as well as in some other, where cotton only figures as a minor crop at present.

The short-stapled cotton, which is now almost universally grown, is admirably suited to the soil and climatic conditions which obtain in the cotton-growing tracts. The fertility of black cotton soil is proverbial. It varies in depth from 2 to 12 feet, and in texture and colour from the deep fine-grained and almost jet-black soil of low-lying fields to the shallow grey soils of the higher land containing more sand and lime-stone. The latter gradually merges into the former, the grading process being largely due to the effect of water. The cultivation of cotton is mostly restricted to the better classes of soil, but owing to the great boom in the cotton trade and the consequent rise in prices of late years, cotton is now often grown on the light inferior soils. In these latter soils it can only be grown profitably while high prices prevail; any considerable fall in prices would result in the substitution of sesamum or some of the smaller millets which make less demand on the plant-food of the soil.

The climate of the cotton tract is drier than that of the rest of the provinces, and recent years of short rainfall have been peculiarly favourable to cotton. The average rainfall for the last 40 years varies from about 32 inches in Nimar to 46 in Nagpur. As the rainy season extends over a period of $3\frac{1}{2}$ months only, *viz.*, from the middle of June till the end of

September, the surface soil gets very dry and begins to crack freely by the beginning of November. The fissures increase in number and size during the dry weather, and injuriously affect the cotton crop later by letting in the drought and breaking many of the rootlets. The only remedy for this is to do as much interculture as possible up to the time that the plants flower. This secures a fine surface mulch which checks evaporation and the consequent cracking of the soil. To succeed under these peculiar climatic conditions, the cotton grown should mature in about five months, so that at least one good picking is obtained before the drought begins to be much felt. The two indigenous varieties commonly grown, namely, *Jari* (*Kativilayti*) and *Bani* (*Hinganghat* or *Gha't Kapa's*) mature in about 5 and 5½ months, respectively, while the only exotic that has given promise of success is Upland Georgian which matures even earlier than *Jari*.

The *Jari*, which is now almost universally grown, is one of the coarsest and shortest-stapled cottons produced in India. Its origin is not well known. It is said that the *Jari* grown thirty years ago was comparatively a superior cotton, that it spun up to 16's or even 20's, and was in demand in the Bombay market for export to England. The present *Jari* falls far short of this description. Its staple is coarse and short, at its best it spins up to 10's only, and it no longer finds a market in England, not being suitable for use in the Lancashire mills. The introduction of the coarser strain is said to date from about the year 1873. In that year a white-flowered cotton, which was said to give 50 per cent. of clean cotton, which ripened early and which was a most prolific yielder, was introduced into Berar from Khandesh. The first cultivators of this new introduction, having observed that the seed possessed a sharp black resembling a thorn, and having concluded that it was a foreign variety, named it *Kativilayti* or '*Thorned English*.' This *Kativilayti* proved to be a most vigorous grower and a big yielder, and readily adapted itself to the soil and climatic conditions of these Provinces. Its botanical designation is *Neglectum roseum* and *Neglectum roseum Cut-thica*, there being two types with white flowers, but the one giving a slightly better lint than the other. The *Jari* which it has largely supplanted was most likely of the two finer-stapled

types, *viz.*, *Neglectum malvensis* and *Neglectum verum*, mixed with a fairly high percentage of Bani (*Gossypium indicum*) which was the predominant cotton in those days. The percentage of the coarser type in this mixture has gradually increased until the Jari of the present day contains from 70 to 80 of the coarser, *i.e.*, the *Roseum* type. The reasons would seem to be that Kativilayti is a hardy cotton and a big yielder, and that despite its coarseness it finds a ready market at a good price both for export and for the use of Indian mills. It is exported mainly Germany and Japan, where it is found very suitable for mixing with wool in the manufacture of coarse woollen fabrics; in this country the existence of a large quantity of machinery especially constructed for dealing with short-stapled cotton also gives it an artificial value. The ryot, recognising that Kativilayti is a hardy cotton, it suffers less than other varieties from the exigencies of the climate, and gives large fluffy bolls with a very high percentage of lint to seed, prefers it to the finer types which have less bulky bolls. The good cultivator in Berar who selects and gins his own seed, chooses only the big fluffy bolls, *i.e.*, bolls of the *Roseum* type. The percentage of the coarser types in this mixed cotton known as Jari is thus gradually increasing at the expense of the finer.

While the coarser types of Jari are thus ousting the finer, the Jari mixture is at the same time ousting Bani. *Bani*, *Hinganghat* or *Gha't Kapa's* is a cotton of long staple and silky fibre. The percentage of lint to seed is about 26 compared with 32 per cent. for the finer types of Jari and 40 per cent. for the coarser. Its staple is about 1" in length as compared with $\frac{1}{2}$ " for the coarser type of Jari. In 1878 there were 1, 558,426 acres of Bani grown in Berar and only 629,653 acres of Jarii; in 1906 there were 2,558,320 acres of Jari and only 639,580 of Bani. In the Central Provinces Bani has suffered even more. Of the 1,536,900 acres under cotton last year, there were only 58,011 of Bani. This variety, formerly known as *Hinganghat* or *Gha't Kapa's*, had earned for itself a name, and was exported in large quantities to England long before spinning and weaving had made much headway in India. When grown pure, it was suitable for spinning 40's. At present the home of Bani is the plateau districts, extending in a horse-shoe shape from

Nimar in the West to Chanda in the East. That plateau includes most of Buldana and Yeotmal and parts of Akola in Berar, and part of Nimar, Wardha and Chanda in the Central Provinces. In Chanda, where it is grown as a cold season crop, it is known as Chanda Cold-Season Jari ; it is known as Nimar; in Nimar, as Hinganghats in Wardha from the tahsil of that name in which it used to be largely grown, and as *Gha't Kapa's* in the Berars and the Nizam's dominions. This plateau is mostly situated from about 30 to over 100 miles from the railway. Where the communications have been improved by the opening up of new lines of railway as in Wardha, Chanda and Nimar, Jari is fast encroaching on the Bani tract, and the cotton now grown there is much mixed with Jari. In the more isolated parts of this tract, however, Bani is still grown almost pure. The very best cotton sent to the Akola market at the present time is *Gha't Kapa's* (Bani) from the Nizam's dominions beyond the Painganga and from Basim, a taluq of Akola. Would Jari pay better than Bani if grown in the Bani tract, is a question that is often asked. Judging from the facts that in that tract buyers give only Rs. 2 or Rs. 3 more per khandi of Bani Kapas than for Jari, and that the outturn of Jari is recognised to be somewhat higher than that of Bani in ordinary years and still higher in years of drought or of excessive rain, we believe that Jari would be the more profitable variety at present prices. Bani-growers, however, like other cultivators are a conservative class, they know no other variety and will be slow to introduce even a more profitable variety.

The only other cotton grown by ryots in these Provinces is Upland Georgian, an acclimatized exotic introduced about 30 years ago. It is equal to Bani in length of fibre and will spin up to 40's, but it has deteriorated very much in strength. The total area under pure Upland Georgian in all these Provinces will not exceed 100 acres. The other cottons that have been tried on the Nagpur Farm on an experimental scale are tree cottons, the various annual species from other provinces and new and acclimatized exotics. The tree cottons that have been tested have without exception proved failures ; others are still being tried. Of the various species of indigenous cotton from other provinces, not one has been found equal in profit-

yielding to the local varieties. The finer-stapled varieties such as the Bombay *herbaceums* take from seven to eight months to mature, and are not therefore suitable for our climate with its short rainfall for reasons already explained. Some of the early-maturing *neglectums*, all short-stapled species, thrive well, but they give a smaller outturn than the local Jari and their fibre is equally coarse. The unacclimatized exotics tried or at present under trial, including American, Afghan and Egyptian varieties, have given little hope of success. By sowing Egyptian in April or May with irrigation a small but unprofitable outturn of lint of weak fibre was obtained. From the many trials made with these cottons, it is evident that a variety which takes seven or eight months to mature has no chance of succeeding unless sown before the rains; but as irrigation is available in the paddy districts only, where owing to the higher rainfall the climate is unsuitable for cotton of any kind, it follows that there is little chance of being able to introduce such a variety, be it ever so desirable.

Of the acclimatized exotics *Buri* is far the most promising yet tried. It is an acclimatized type of American Upland, the seed of which was obtained from Bengal two and half years ago through the Inspector-General of Agriculture. This cotton has long been grown in the Sonthal Parganas of Bengal under the name of Buri, and is said to be the best foreign cotton tried there. It has been successfully grown on the Nagpur Farm for the last two years, and gives remarkably big bolls and the staple is very good. Several private cultivators to whom small quantities of seed were given last year are already sending in orders for as much Buri seed as they can get as they wish to try it on a larger scale next season. Botanically it resembles Upland Georgian, but matures three weeks later. It is suitable, therefore, for our short rainfall. Khan Bahadur Bezonji, Manager of the Empress Mills, who inspected the growing crop of Buri and to whom samples of the different varieties of cotton grown on the farm, including selected and unselected Upland Georgian and Buri were afterwards sent for valuation, described Buri in the following terms:—"The best outturn we have found is Buri which should be paid the greatest attention to. The staple is as good as fully good middling American. I believe the yield per acre will be very great and

if it can be successfully grown, the Jari would soon be ousted." He calculated that it would spin up to 40's and that its value per bojha of 345 lbs. was Rs. 150 with Jari selling at Rs. 90 and Bani at Rs. 130. One particular strain of selected Upland Georgian was valued at Rs. 5 more than the unselected.

With the exception of Upland Georgian and Buri cotton, the former of which has been a partial success only, and Buri the success of which is not yet assured, all attempts to introduce long-stapled cottons in these Provinces have failed for reasons already explained. The Agricultural Department, therefore, in considering new measures for improvement, has wisely directed its efforts mainly to the improvement of the quality and outturn of the local varieties chiefly. The general scheme of improvement includes : (1) plant-to-plant selection of seed of all indigenous and exotic varieties likely to do well in these Provinces ; (2) hybridizing ; (3) the trial of exotic varieties ; (4) manurial experiments ; and (5) the distribution of pure seed of improved varieties to the ryot through the agency of cotton seed farms.

Plant-to-plant selection is carried out on the Experimental Stations under the direct supervision of an Agricultural expert. Cotton is grown on special areas for selection ; the land is well manured and carefully cultivated ; the plants are thinned out so as to give them plenty of room for their full development. A few of the very best plants out of thousands are then selected as mother plants of which the seed is to be kept for propagation. In selecting the plant, its shape, vigour of growth, its freedom from disease, and insect pests, and the quality of its lint are all considered. The cotton of each plant that satisfies all these conditions is stored in a separate bag and weighed ; the cotton of all plants that fail to give a certain weight of lint are afterwards discarded. The seed of each plant that passes all these tests is sown in a separate line, and from each line mother plants are again selected next year. In nature like begets like ; the offspring of any one mother plant should be good as a whole, *i.e.*, they should be true to type, but some will always be found to be more prolific than the mother plant, others will be found to give a finer lint. By carefully inspecting the individual plant and by selecting the very best year after year, the strain is gradually improved. This

work is now receiving very careful attention at the Experimental Stations, and it is certain that much good will come out of it.

Some progress has also been made in plant breeding, but so far no definite results have been obtained.

Trials also continue to be made with exotics, Buri and Upland Georgian receiving special attention. There is good prospect of the former being successful.

The only manure used for cotton at present is cattle-dung but the supply is very small, as in the cotton tract there is much less grazing and fewer cattle kept per acre than in other parts. A part of the already inadequate supply is used for fuel, especially in the cotton-growing districts of the Central Provinces ; consequently experiments are now being carried out at the Agricultural stations in order to test the effectiveness of other manures as crop-producers. Cattle urine conserved by the dry-earth system, is found to be equal in value to cattle-dung, and measures are being taken to induce cultivators to save this valuable part of their manure which they have totally neglected so far. Artificial fertilizers are also being tried and from results already obtained there is good reason to hope that nitrogenous fertilizers (such as nitrate of soda and sulphate of ammonia) can be supplied very economically to cotton grown in these provinces. The results obtained last year from a series of experiments in which nitrate of soda, superphosphate and sulphate of potash were applied to cotton, gave the results shown below :—

The conclusions to be drawn from these experiments are:—(1) That nitrogen alone is deficient in this particular soil, and that from an economic point of view nitrate of soda is a highly profitable manure ; (2) that the cotton crop is not materially benefited by applications of potash or superphosphate without nitrogen; (3) that when potash and phosphate are applied along with nitrogen, the value of the increase is not sufficient to cover their cost ; (4) that potash and phosphate, applied together or singly without nitrogen, result in a dead loss. Another fertilizer that should do equally as well as nitrate of soda as a manure for cotton is sulphate of ammonia. The cotton manured with it at the Akola Experimental Station has this season done better even than that manured with nitrate, though the final outturns have not yet been ascertained. If it is found possible to produce this useful manure at cheap prices as a bye-product of the Iron Works to be constructed by Messrs. Tata & Co., we believe that it will give a fresh impetus to cotton cultivation in these Provinces.

Another line of work, which is receiving due attention from the Agricultural Department, is that of establishing cotton seed farms, from which pure and selected seed can be distributed to the ryot. These seed farms have already been in existence for the last three years, and have met with a considerable measure of success. The land belongs to private cultivators who supply the manure and labour ; the Department of Agriculture sends an Agricultural Assistant to supervise the cultivation and to advise the owner as to its management. The owner guarantees to follow the improved methods of cultivation prescribed by the Department for seed production. The Department on its part guarantees to compensate him for any loss he may suffer thereby. The cotton is ginned on a Platts' gin driven at a slow speed by a bullock-gear. The seed is purchased and distributed by the Department. As the policy of the Department is to encourage private enterprise, the assistant in charge is withdrawn as soon as it becomes evident that the owner is capable of managing the farm successfully without him ; but the Department will continue to supply the owner with a fresh strain of selected seed for the Experimental Stations each year. It will also continue to assist the owner to find a good

market for his seed, either by purchasing it for distribution as at present, or by advertising it widely for him. This line of farming should prove to be a most profitable one for the owner, who can establish a reputation for supplying superior seed. It will at the same time be a great boon to cultivators who at present often experience great difficulty in getting good seed for sowing. Seed farms also serve as demonstration farms where the best methods of cultivation are practised, where new manures that have been tested at the Experimental Stations are tried on a field scale, and where all the most desirable cottons, including new crosses and varieties, can be grown before distribution to cultivators.

These in brief are the measures that are being taken for the improvement of cotton in the Central Provinces and Berar. As yet the work has but begun, but steady progress on these lines should have far-reaching effects. It will enable the cultivator to procure supplies of pure and improved seed of the indigenous varieties and of such acclimatized long-stapled varieties as are likely to succeed in his tract. It will enable the local manufacturer to procure better lint of the present short-stapled Jari and of a purer form of Bani ; it will, we hope, also enable him to obtain locally a larger supply than he does at present of the long-stapled varieties instead of having to import them from America, as he is compelled to do under existing conditions. The work of improving this, our most important crop, is thus being conducted on sound Swadeshi lines.

CULTIVATION OF COTTON IN BERAR.

By W. V. CHANDEKAR, ESQ.,

Tahsildar, Darayapur (Berar).

" When you view the industrial situation, gentlemen, the first thing that forces itself on your attention is the primitive condition of the premier industry of the country, I mean the Agricultural Industry—the industry which supports more than 65 per cent., according to Lord Curzon 80 per cent., of our population, and on which we must depend for our subsistence as well as for the raw material of our chief manufacturing industries.

" I rejoice to see the greatest landlord of all in India, namely the Government, is recognizing his duty and has taken, and is taking, measures to spread a scientific knowledge of Agriculture, by means of colleges,

experimental farms and such other measures, to free cultivation from insect pests and to introduce new and valuable forms of the Agricultural industry.

" Few people talk of the Swadeshi movement in connection with Agriculture. But really that is the industry which most requires the application of the true Swadeshi spirit, for, on it are based all our possibilities of manufacturing industries," (*The Hon. Mr. Vithaldas Damodher Thackersey, in his Presidential Address at the Second Indian Industrial Conference.*)

INTRODUCTION.

The small province of Berar known in days of yore by the name of Vaidarbha has been famous for its cultivation of cotton. It grew some of the best varieties of the plant yielding a fine and strong fibre. It was the home of the once celebrated Jadi and Bani varieties which flourished to a large extent and afforded a superior sort of material not only to the mill industry in India but also to that in England. When England was unable to get cotton from America in the sixties of the last century, the cotton of Berar supplied the deficiency to a considerable extent in quantity and quality as well. In view of these facts the statement made by Mr. Vithaldas Damodher Thackersey that "if the mill industry flourishes in Western India, it is because the Gujarati is acknowledged on all hands to be the most efficient cultivator of cotton in India," requires to be modified to some extent.

AREA UNDER THE CROP AND ITS EXTENT.

2. Berar is pre-eminently a province of agriculture, and amongst its agricultural products cotton stands first. Nearly two-thirds of the culturable area is now grown with cotton. Its cultivation has immensely and very rapidly grown during the last ten years as will be seen from the following table:—

	Area in acres.	Remarks.
1896—97	234,709	Year of scarcity.
1897—98	2,150,709	
1898—99	2,471,123	
1899—1900	1,681,418	
1900—01	2,521,651	Famine year.
1901—02	2,689,201	
1902—03	2,765,635	
1903—04	2,851,000	
1904—05	3,069,000	
1905—06	3,197,900	

3. The increase is observable in all the districts, but it is most in the districts of Amraoti, Basim and Yeotmal. In the latter two districts large tracts were lying fallow and have recently been brought under the plough. The taluks of Wun, Kelapur, Yeotmal, Darwha, Mangrul and Pusad have contributed a great deal towards the increase. For sometime there was a belief that these tracts were not suitable for the production of cotton but recent experiments have removed the misapprehension. Most of the land in these tracts is what may be called virgin soil, and hence the cultivation of cotton is found specially paying. Even in tracts where cotton has been sown since days of yore, more land is being brought under its cultivation to the exclusion of other crops—more especially Jaori—the staple food of the province. I have remarked above that the increase in the area under cultivation is observable all through the province, and the following table bears this out. It shows the increase in the area brought under cultivation in the several districts of the province.

			1866—67.	1904—05.
			Acres.	Acres.
Akola	...	...	406,862	743,268
Amraoti	...	...	182,183	715,127
Basim	...	...	62,241	360,059
Buldana	..	...	195,113	421,768
Ellichpur	...	...	309,172	348,591
Yeotmal	...	...	131,161	478,211

DECLINE OF THE INDIGENOUS VARIETIES.

4. It is satisfactory to note that the cultivation of such a useful article for trade should increase to such an extent, but it is to be regretted that along with the efforts towards the increase of area there have been absolutely no endeavours to improve its quality. This has resulted in the deterioration of the commodity produced and the fair name of the province has suffered.

5. The evil seems to have been recognized as early as 1867. Dr. Hume then remarked that—

“The subject of cotton in Berar is one that requires immediate supervision. It has been left in the hands of ignorant Kunbis who have no thought for the morrow, but grow whatever pays best at the time. The

Khandesh variety is being grown largely to the ousting of other varieties to the most certain ruin of the Berar cotton trade. At present they get from Vilayti Khandesh an early crop, also a large one, getting three or four pickings instead of two or three as they get from the indigenous cotton. They get Rs. 8 or 4 a bale less in price than for the indigenous cotton, but the greater bulk compensates much more for this small loss. But this apparent prosperity will be short-lived, for it is only by mixing this Vilayati Khandesh cotton with the indigenous cotton that merchants can get it accepted."

EARLIEST VARIETIES.

6. The earliest varieties grown in the province were Jadi (Chanda Jadi) and Bani. The former was a cold weather variety, fine and silky, staple $1\frac{1}{2}$ inches. The latter was sown at the beginning of the rains, fine and silky, staple about 1 inch. Later on came into existence Jadi sown at the beginning of the rains, hard and prolific, coarse, staple about $\frac{3}{4}$ inch. These have been described as under:—

"*Jadi* :—Tall sparsely branched plants. Lower branches long, slightly ascending, median upper sparse, more or less drooping, becoming successively shorter, apex of simple stem much produced. Leaves dark green, strongly heliotropic. Bractiols triangular, entire or slightly toothed upwards. Petals reflexed, yellow or white.

"*Bani* :—Tall sparsely branched plants. Lower branches long, slightly ascending, median and upper sparse, short, more or less drooping, becoming successively shorter, apex of simple stem much produced. Leaves yellowish green, entire to three-lobed usually, lobes broadly ovate. Bracteoles triangular, entire or slightly toothed upwards. Petals reflexed, yellow or white. Cotton scanty and fine in the most typical examples." (Mr. G. A. Gammie.)

THEIR QUALITY AND OUTTURN.

7. Both Bani and Jadi yielded long staple. The lint of the former was uniformly fine, more glossy and silky than that of the latter, though its outturn was comparatively less. Both the varieties ripened late. Bani was more delicate and was less adapted to stand the fitful changes of the seasons. Both these varieties continued to grow in the province and commanded good price in the Bombay market until within the last forty-five years, when they were ousted by the plant now known as Kantabilayati, Bilayati, Hourii, or New Jadi.

8. This variety in recent years has become very popular because of its sturdy character and ability to stand both excessive rain and partial drought. Says Mr. Gaskin :—

"Jadi is popular because of its hardiness and certainty, its heavy yield (1,000 lbs. seed cotton giving 330 lbs. lint per acre), the ease with which it is picked up and the fact that it ripens early and so can be placed on the market in October."

9. In 1896-97 there was an early cessation of rains as has been the case in the year we have been passing through. The rains stopped in September, and yet the cotton yielded a harvest of from 8 to 12 annas. Even in the current year the outturn varies from 6 to 16 annas according to the soil and other circumstances. Another peculiarity of this variety is that it yields a bumper crop with a rainfall of 20 inches evenly distributed throughout the seasons. Bulk for bulk its yield is much larger than that of the old Jadi and Bani though the staple is much shorter and less glossy. The old varieties come into market in January and February, whereas the new plant ripens much earlier and enables the cultivator to line his coat with silver in the months of November and December. These circumstances mostly have effectively thrust out the old indigenous varieties of cotton. The change, it is said, came about in this way.

10. With a view to improve the cotton cultivation in the province Government introduced the seed known by the name of Bilayati or Houri. It is also called Jadi in some provinces, but I consider it has to be distinguished from the old Berar Jadi variety known as Chanda Jadi. The seed was distributed *gratis* to try its growth, and the experiment proved that the variety introduced was suited to the soil and the conditions of the country in such a remarkable manner, that before long it became popular among the agriculturists to such an extent that the old varieties were completely forgotten and driven out. In connection with the introduction of this variety Mr. Gaskin observes "that by the irony of fate the very cotton which the Government endeavoured to eradicate became known as one which they had introduced. Could confusion of ideas go further?"

11. According to Mr. B. P. Standen, C.I.E., "These are hardy plants which can be cultivated with success in any part of the province where the soil overlies trap and drains early and the temperature of the cold season is not so low as to kill the plant in December." According to him Jadi (the

local Hourī) has thrust out the old indigenous varieties Bani and Jādī, "because the former even in the most favourable years pays better than the latter." The same officer is of opinion that the cultivation of Bani on the Ghats south of Berar is due to a spirit of conservatism on the part of the cultivators rather than to any prudential considerations.

12. "Not only does Bani yield a smaller proportion of lint than Jādī (Hourī), it gives also, under the most favourable circumstances, a smaller average crop being more liable to damage from the vicissitudes of the season." Such, in short, are the circumstances under which the old famous Berar varieties of cotton have dwindled and disappeared. Jādī as sown in these provinces, is a mixture of the following four varieties :—

(1) *Gossypium neglectum malvensis* ; (2) *Gossypium neglectum vera* ; (3) *Gossypium neglectum rosea* ; (4) *Gossypium neglectum rosea catchica*. (*The "Agricultural Journal of India,"* page 188).

CLASSIFICATION OF SOILS.

13. The soils of Berar have been classified under seven heads known in the local language by the name of (1) Kali—deep black soil ; (2) Marwand—black ordinary ; (3) Paudhari—white, adjoining the village habitations and popularly called Akhars ; (4) Chopan or Chikani land over which a white substance gathers in the rainy season and is mostly devoid of productive capacity ; (5) Malai—alluvial land formed by floods ; (6) Pivali—yellowish ; (7) Kharad Barad—rugged and stony land of inferior quality. Of these the first, the third and the fifth, *viz.*, the black soil, the white soil adjoining the village habitations and the alluvial formed by the floods of rivers are specially adapted for the cultivation of cotton, although it is capable of growing in all the seven varieties detailed above. The difference is purely one of degree.

PREPARATION OF THE SOIL.

14. *Ploughing*.—Unlike the white soil adjoining the village habitation, and the alluvial, the deep black soil does not require to be ploughed every year for the cultivation of cotton. For its better cultivation it is necessary to plough the other varieties of the soil. It is carried out with an implement,

Naugar-plough, to which are yoked two to three pairs of bulls. The implement consists of a block of bent wood two cubits long with a curve in the middle, close to which is attached an iron bar कुशा pointed at the front, and is parallel to it. The iron bar is fixed to the block along the tooth (Dat) parallel to it and is longer than it by a span and is enclosed by an iron ring. To the straight block is attached a pole to which the bulls are yoked.

15. Although the black soil may not be ploughed every year, it needs ploughing at least once every three years. The ploughing is undertaken to make the soil soft so that the seed may have no difficulty in sending down its roots deep. Another object with which this operation is made is to turn up the land inside out in order to bring up down strata so that the seeds may thrive better. The operation is as costly as it is difficult and tedious, requiring hard and strenuous work. Its cost is usually Rs. 16 per tiffan of four acres or Rs. 4 per acre. Four men with three pairs of bulls are required to plough, three men to drive the three pairs of bulls yoked, and the fourth to hold the handle in order that the iron bar may go on working straight and deep. It is the force of this man that drives the bar deep.

16. *Harrowing*.—Another measure adopted towards the same end and which has to be repeated annually in all soils is tilling (वखरणे). It is carried out with an implement, harrow (वखर), consisting of a block of wood with two teeth at either end to which is attached a piece of iron bar (पास) and a pole to yoke the bulls. The first operation, viz., ploughing, is usually carried out soon after the harvest. When done at this time it is more economical and less tedious. Two pairs of bulls are enough to carry it out. The latter, harrowing, is undertaken on the new year's day—*Chaitra Shuddha Padva*—and is continued and repeated till the commencement of the rains. The plough is worked usually once, but the harrowing has to be done at least twice. The first working technically known as Vahi (वाही) is called Ekarni (एकारनी) and the second Vahi, which is done crosswise, is called Dubharni (दुभारणी). The more the land is harrowed the better it becomes fit for cultivation. The last working of the harrow is called

the Jambluel Vahi, and is usually undertaken when the monsoon bursts and is preliminary to the sowing operation.

The cost of harrowing Ekarni and Dubharni is usually Rs. 5 per tiffan of 4 acres. A pair of bulls with a man harrows a tiffan of 4 acres in three days. The Dubharni is undertaken a month afterwards in order to allow the earth to be soaked with sun's rays before the second turning.

17. *Manuring*.—The most common manure is the dropping of cattle and the refuse of the stables including cattle's urine. They are collected and deposited in waste land adjoining villages. Many stack them in pits specially made. Most of the agriculturists make use of it within four or six months of their stacking, but a few allow it to rot for a year, and then it is removed to the field and spread across it before the harrowing begins.

18. Another mode of manuring is to allow the flocks of sheep and goats to stand over the field for days, so that their droppings and urine may fertilize the land. Cows, bulls and other cattle are similarly moved from place to place in the fields for the same purpose in the hot season.

19. Human excreta is also used for manuring. Its use, however, is confined to fields adjoining the village lands and known as remarked above by the name of Akhars. Powerful and valuable as this manure is, the villagers get it absolutely free. The fields adjoining the gaothan—habitations—are the public latrines of the villagers. To them they resort for purposes of nature throughout the year, and hence the Akhar fields are looked upon as of great value. With plenty of rainfall at seasonable intervals an Akhar field yields double the outturn of distant fields. Hence Akhar fields always fetch a higher price than the others.

20. Other manures are unknown. The modern science of agriculture is yet a sealed book to the Berar agriculturists, and happy will be the day when it is opened to them.

21. The manure collected in pits and stacks is removed to the fields and is spread over in a number of places in small heads. This is usually done soon after the removal of the crop and about the month of Falguna-Shimga. These heaps are spread over with a shovel all over the field before the har-

rowing begins. The harrowing mixes the manures with the soil reducing it to minute atoms and assimilating it.

22. The improved method of manuring which has recently been adopted in a very few individual cases requires to be prominently mentioned. It consists of fertilizing the land at the time of sowing by the same implement with two additional *sarates* (सरते) attached in front. The manure made up of stable refuse and cattle droppings is pulverized and the powder is dropped through the front *sarate* (सरते) just as the seeds are dropped in the hind ones. The effect of this mode is that the seed drops and takes root exactly in the spot manured. This method is more effective and economical but it is said that it has a temporary effect just only for one season. The manure spread in the old style has the power of fertilizing for a longer period, at least for three years.

23. At present the old method is more popular and is considered more beneficial in the long run. The point is one for the consideration of experts and for experiment by practical workers. I consider both the methods have their advantages. The latter, the newly adopted method, is yet in an experimental stage, and pronounced opinion as to its superiority or otherwise over the former would be rather premature.

24. There is yet another mode of fertilization. It is independent of manures and consists of sowing crops by suitable rotations. In the language of the agriculturists this method is known by the technical term *Biwad*. The fields sown in the preceding year with sesamum, gram, wheat, lac, linseed, are considered well adapted for the cultivation of cotton. If cotton is sown after sesamum it is said that the field has had sesamum *Biwad*. It is the best *Biwad*. Rabi crops *Biwad* is superior to that of Kharif crops, *viz.*, jaori, turi, odid, muga, &c. But any rotation is preferable to sowing cotton after cotton in successive years.

ROTATION OF CROPS.

25. I have known of instances where agriculturists have prospered in the cultivation simply by the punctilious adoption of rotation of crops. Sowing by rotation does not require much extra cost or labour in cultivation, yet 90 per cent. of cultivators do not follow it because they find the cultivation

of cotton after cotton according to their crude notions less troublesome and more remunerative.

This neglect of the rudimentary rules of the science of agriculture may be attributed to the easy-going habits of the cultivating classes who have been immensely wanting in the spirit of industry and perseverance.

SELECTION AND PREPARATION OF SEEDS.

26. The selection of seed for cultivation is known by the name of Alkabalka. At one time it was practised by the agriculturists extensively. The mode adopted was to select the best bolls at the second picking and stack the cotton in a heap by itself. The cotton was separately ginned and the seeds so obtained were reserved for sowing for the next season.

The practice of harrowing has for all intents and purposes died out, though it is said that it is followed by a few individuals in some villages towards Akote and Ellichpur.

Any seed is now considered good for sowing and no effort is made towards selection. For sometime after the introduction of ginning factories, seeds of machine-ginned cotton were looked upon as unsuitable for cultivation. But the prejudice is fast dying out, and now the sowing of hand-ginned seeds is more an exception than a rule. Experience has proved satisfactorily that machine-ginned seed is as good for sowing as that obtained by hand gins. The omission to keep a supply of seeds before sending the cotton to market often lands a cultivator in difficulties, and these he tides over by purchasing from Marwaries such seeds as he may sell and pay the price he dictates.

27. In view of these circumstances it is necessary to revive the old and useful practice of Alkabalka selection. But this point will be more appropriately treated under the head of Improvements Suggested.

28. Cotton seeds previous to sowing are passed through a sieve. A *charpoi* is usually used for this purpose and cotton seeds are rubbed over it. These are then bathed in a lotion made of a mixture of black earth and cattle droppings. In some places they are bathed in a lotion of black earth only. Some people prefer white earth for this purpose. This process

is undertaken to prevent the seeds from sticking to each other and to facilitate their dropping down with ease through the *sarate*. It is said that in times gone by the cotton seeds used to be bathed in water mixed with assafoetida, but the practice seems to have got into disuse long since. Such a procedure is considered quite unnecessary because the seeds are not liable to be infected by the insects before germination. The sowings begin with the outburst of the monsoon in the Mrig Nakshatra falling usually on the 5th to the 7th June, and is continued throughout that Nakshatra and also through the next Nakshatra of Ardra. The time for the sowing is called *वार्ता* and is limited to these two Nakshatras of 15 days each. Roughly speaking, it has to be sown from the middle of June to the middle of July. In a few cases they sow cotton in the dust even before the rains set in.

29. Seeds so sown germinate and flourish well with a seasonable and copious rain, but oftentimes they are in fear of being eaten away by birds or being otherwise damaged. The popular belief is that cotton sown in the Mrig Nakshatra yields a bumper harvest, and hence it is that as noted above, some cultivators sow it in dry earth even if there be no rains in that Nakshatra.

30. The sowing is carried out by means of the implement called Doosa. It consists of a block of wood like that of the harrow with the teeth and the Pas—the iron bar removed. In place of the teeth are put in pegs made of Babul wood. They serve to make the lines over which the seeds drop. Behind the pegs, parallel to them and at a distance of three cubits, stand two pipes of bamboos. These are called *Sarate* (सरते) and through them the seed is dropped. Five men are required for sowing; one to drive the 'Doosa,' two for dropping the seeds in the bamboo pipes, and two to drive the harrows following the lines sown to spread earth over the seeds dropped in the soil. Oftentimes the harrow behind the Doosa is replaced by a bundle of Babool branches drawn across the lines sown. It is called *Fasati*. Of late the agriculturists have taken to put up these Sarates to the Doosa with a view to save time and money, and *Tasati* also is more freely employed toward the same end. The cost of sowing is on an average Rs. 5 per tiffan of 4 acres.

GERMINATION.

31. Germination begins in four days and the first two leaves are put forth in a week. In a fortnight is undertaken the operation of putting fresh earth around the seedlings. It is called Davaran. The implement used in carrying it out is called Davara and is like the Vakhar except that it is of smaller dimensions to admit of its running between the two lines of the sowings. An iron bar, Pas, is attached to the teeth (बानकुट) and it shoves on earth over the roots of the young plants. Two Davaras are worked by one pair of bullocks driven by two men. The average cost is one rupee for a tiffan of 4 acres. The operation is called Ekatashi Davaran in the agricultural dialect and is usually undertaken when the seedlings are four fingers high. When carried on when the plants have grown a span high the operation is called Dotashi Davaran. The difference in both the operations is this, that in the former the implements run only once in each line and that in the other it runs twice. The latter operation affords more nourishment to the young plants. Its cost, however, is double that of the former. The Davaras are worked from two to four times in a season. The more they are worked the better the crop thrives receiving more nourishment at each working.

32. Another implement used for the same purpose is called Doonda, and is similar to the Davara except that the former is larger in dimensions than the latter. The operation made by it is called Doondan, and is usually undertaken after the Dotashi Davaran has been finished. Working of Davaran and Doondan is usually begun in Shravan and is continued till Ashwin when the plants flower and blossom.

33. Simultaneously with Davaran and Doondan is carried out Mindian, the weeding out of the wild growth, and is continued till the plant ripens and bears bolls.

34. Cotton is sown by itself. But sometimes and in some rare places and cases it is sown as a mixed crop with tur. It is so sown in the proportion of 20 lines of cotton to one of tur. Cotton is sown in lines at a distance of two spans. Cotton plants are sown close to each other. It is usual to keep a distance of about 2 inches between each plant; but this distance is not enough and more distance is needed to let the

plants grow and spread freely. When it is found that the sowing has been too close some of the plants are weeded out to enable the crop to thrive. Plants sparsely placed thrive better and yield a comparatively larger outturn than those allowed to remain very near to each other.

35. The average outturn of cotton is 2 khandies equal to 300 sers of 80 tolas per tiffan of four acres and its average market value is Rs. 50 per khandi. It would thus appear that an acre of land under cotton cultivation yields a crop of Rs. 25 to the cultivator. The cost of cultivation is usually Rs. 6 and the Government rental is Rs. 2. Thus with a cost of Rs. 8 the farmer is able to earn Rs. 25. This is an ordinary yield, and is capable of being increased to double the quantity and price and even more by the use of manures and regular and systematic agricultural operations.

36. The picking of cotton is usually begun after the Diwali. The work is carried out by women and children. The payment of wages for this purpose is made in kind. About a twentieth part of the cotton picked up by the labourer was given to him as his wages. This practice is still in vogue in some places, but it has been replaced by cash payment in recent years, because the payment in cash is found more economical to the cultivator. The usual rate of cash payment is annas 3 per maund of cotton picked. In fields with a large outturn a labourer is able to pick from two to three maunds of cotton a day and thus earn a wage of six to nine annas. But the payment in kind enabled him to get 10 to 12 annas a day for the same quantity picked. The twentieth part of the picking was given for the first picking, and for the subsequent pickings a higher proportion had to be given, with the result that the labourer carried away the greater portion of the picking. To prevent this the present system of cash payment has come into vogue.

DISEASES.

37. Unlike Jaori the cotton plant is not liable to many diseases. It thrives on vigorously until the Hasta Nakshatra. Rainfall during the first quarter of it renders the soil hard and is not very beneficial to the plant. But the rainfall in Chitra is mischievous. In consequence of rain in that period flowers

and blossoms borne by cotton plants drop down considerably. Later on, in consequence of extreme cold, a disease called Chikta infests the cotton plants, but it disappears as the sun grows powerful in the day.

38. Sometimes, owing to excessive rains in the cold weather, the cotton bolls are infected with insects. The agriculturists know no remedy for it, and they look to nature for its cure, and nature, affords it. The general experience is that with the clearing of the weather accompanied by sunshine and heat the insects die of inanition. A number of insects attack cotton. These have been described as under by Mr. H. Maxwell Lefroy :—

“ First, when the cotton plant is still small and flowers are not yet come, you will see that the leaves are sticky and the plant is sticky, and if you look carefully you will see many small creatures dark-coloured or yellow, like many little grains, on the lower side of the leaf ; these cause this sickness. In good seasons this disease will go away and your plant will become well ; many other insects will come to eat these little creatures ; you will see these on the cotton plant, little yellow insects with black spots like half a pea, and others. If the disease is very bad you should take ashes finely powdered, and in the early morning when the plant is wet with dew, you should sprinkle this on the plants where the insects are, specially turning over the leaves and putting it on the lower side. Do this only if the disease is very bad and will not go away, as in a good season the plant will get better of itself.

“ After this and when the flowers are coming on the plant, you see many plants get yellow and die ; they dry up and grow no more ; if you pull up one of these and break it across near the roots you will find a worm inside, a long white worm, very big and round, at one end. This it is which eats your plant and kills it. When you find a plant dead like that, no man can restore it but you are to gather all such plants, put them in a heap and burn them, lest the insect come out, breed and multiply and the young, which are very many, eat many more of your plants. If you kill all the insects that infest and kill the young plants, there will be no more to continue eating your plants later on ; so your field will be full of good cotton and there will be no empty places.

“ At this time another insect, green in colour like a little worm, comes in the top shoots and tying all the leaves together, kills them ; you see then the withered leaves at the top of each shoot and if you look you will find the worm. This too you must take away and burn, lest it increase and eat all your leaves and you get no cotton at all. You will find this and the white worm in the stem at the same time, and then the cotton bolls begin to grow and smell before they open. These are eaten by worms, one a pink worm long and slender ; the other a short

thick worm, black and white with many spots. These eat holes in your green bolls to reach the tender seeds within and feed on them; you are to go often to your fields when the bolls are green and look for these worms. When you see a boll that is sick, or discoloured, or that has holes in it, there you will find the worms. If you leave these worms they will come out when they are big, and will breed and multiply till your field is full of worms; these will eat your bolls, and when you come to gather cotton, much is yellow and dirty, very much has been eaten and many seeds are spoilt. You do not get much cotton and much of this is dirty and bad. This is because of the worm; if you go to the fields when bolls are green you will see it. Therefore you are to pick off the first bolls that get worms and so strive to stop the many worms that will come later. If you can destroy them when they are few, they will not be able to multiply and eat many of your bolls. Every two worms will bring nearly two hundred more, so you can see that you must kill the first at the cost of a few first bolls which are already spoilt, if you wish to get more cotton. Many cultivators do not know these things, because they never look in their fields, when the bolls are yet small, and the cotton is not ready. Then, when they go to pick the white cotton, they find little, and much of what they find is dirty and does not sell well. This should not be and you are not to let the worms eat your cotton when you can kill them while they are few. Kill all these, the first that come, and you will see good cotton in your fields."

MEASURES FOR IMPROVEMENT.

39. Having detailed the different processes of cultivation, manuring, picking and outturn, the next question that demands our attention is the improvement of cotton cultivation. The improvements have to be carried out with two ends in view—(a) increase in outturn, and (b) improvement in quality. Simultaneous and continued sustained efforts in both the directions are needed.

40. Experience has shown that the outturn from the variety Kata Vilayati, which is also called Nagpur Jodi or Hourai and which continues to be such a great favourite, has been gradually declining. Many a large and knowing landholder with whom I have had occasion to talk on the subject, has noticed the decline and has been deploring it. This decline must be due to a variety of causes, but the chief cause to which it may be attributed is the selection or rather want of selection of seed.

41. It has also suffered in quality. For whereas in former years the Jodi cotton was suitable for counts of 16's to

20's it can now barely spin 10's. Mr. Gaskin, I.C.S., Deputy Director of Agriculture, C.P., is of opinion that "under the system of selection practised by the ryot, the finer varieties, Malvensies and Vera, are deliberately thrown away and the coarser roseas retained."

42. The old Berar indigenous varieties of Bani and Jadi—Chanda Jadi, were capable of yielding a superior quality of cotton. They produced lint capable of spinning up to 40's. The manager of the Empress Mills, Nagpur, classes Bani as equal to middling American. He says that "it will spin up to 32's easily and 40's with difficulty." Mr. Gaskin is of opinion that "there has been little if any deterioration in Bani. When grown at its best and grown in the old strongholds of the plant it is capable of spinning up to 40's and is probably as good as it was 40 years ago." If the old varieties were superior in quality the new variety excels them in quantity as will be apparent from the following table :—

OUTTURN PER ACRE.

Uncleaned Cotton.		Lint.	Value.
Jadi or Hourli	...350 lbs.	155 lbs. (33 per cent.)	£ 2-0-8
Bani	...250 lbs.	70 lbs. (28 per cent.)	4½ d.

43. Now that the cotton mill industry has tremendously increased throughout India and shows signs of further expansion, the necessity of improving both the old and new varieties is becoming greater day by day. Even in our small province a new spinning and weaving mill came into existence last year at Akola; thanks to the indefatigable and energetic efforts of Rao Saheb Deorao Vinayak and his band of workers. Signs are not wanting indicating a desire to extend them. With their extension both the long and short stapled cotton are bound to have a demand such as never existed before. In view of these facts a revival of the old Bani and Jadi varieties requires to be undertaken. That they are capable of growing in the Berar soil cannot be questioned.

The remarks of Mr. Gaskin on this point are very pertinent and worth quoting. He says :

"I see now with my more intimate knowledge of the country, what I did not realize before, that owing to the physical peculiarities of the Berars, good reasons exist for this seed (Bani) proving a success in some localities and yet not answering in other parts of the province. And this rather confirms the view I have already expressed of the importance of trying to improve, by seed gardens and other measures, the indigenous produce of each tract, the suitability of which to the soil and the climate has been established by long years of local experience. In the almost unfathomable lack cotton soil of the Poorna valley the seed did not answer, and there is reason to believe that the statement of the people that the Jadi (old Chanda Jadi) plant there grown is the class of cotton best adapted to the peculiarities of the soil, is correct and the importance of making further experiments will not be lost sight of. Attention will be given to improving the Jadi seed which hundreds of years of cultivation have proved to be well adapted to the rich land of the valley of the Poorna."

44. Attempts are being made in the Experimental Farm at Nagpur to improve the cotton varieties by acclimatization and hybridisation. The upland Georgian variety of cotton has been acclimatized on the farm during the last ten years, and it has been distributed in several districts of the Central Provinces and Berar where it is reported to have done fairly well. (*Vide* C. P. Farm Reports.) These efforts are of use and value in their way. But I would suggest that it would be more beneficial and is likely to lead to better practical results if more concentrated and continued efforts are made to regenerate the now defunct races of the old Jadi and Bani varieties. These require to be revived and developed with crosses and fertilizers. Efforts in this direction are being made in the farm at Nagpur. "Bani is one of the parents of five of the seven crosses experimented, and it is hoped that the crosses, while inheriting the good qualities of their parent Bania, will show greater vigour of growth and yield better." Similar efforts are needed to develop and improve the Houri or Vilayati now in vogue. For scientific men are of opinion, as Professor Gammie has said, that "the progeny of plants which are artificially cross-fertilized are usually more fertile than their parents. This proves that cross-fertilization is really of great service to the plants."

45. Experience has so far shown that foreign exotic

plants do not thrive in Berar soils. In view of this fact it would be only prudent if efforts are made to develop and improve the indigenous and tried local varieties by crosses, fertilizers and more improved methods of cultivation carried on carefully, systematically and steadily.

46. Along with the selection of cotton varieties suitable to the soil and climate of the country, it is necessary that the seeds used to grow the plants should be well selected. Unlike the Oudh agriculturists, in the Berar agriculturists there exists "a lack of appreciation of the benefits to be derived from choosing seed from the best of the produce." When the cotton has been picked up, it is sent to the market wholesale by farmers small and large. There is absolutely no attempt at keeping a portion of the produce for seed for the next season. In the ginning yards cotton from all places and of all sorts is ginned promiscuously and the seeds also are so stacked. These seeds are purchased in the beginning of the monsoon to sow in the next season. It is no wonder if the outturn and quality of the variety should deteriorate day by day. To remedy this the old system of Alkabalka noted above requires to be revived. It consists of picking up the best bolls in the field at the time of the second picking and stacking the same separately. The cotton so picked is ginned separately and the seeds are preserved for sowing at the next season. The work could be done by the District and Taluka Board members. Most of them are large landowners and their efforts in this direction are bound to be successful. If they follow the practice in their fields and preach it in their circles, a vast change for the better will be apparent before long.

47. The opening of seed depots and their working on lines indicated by Mr. W. H. Moreland, Director of Agriculture, the United Provinces, will be a step towards the same goal and its adoption in Berar will be productive of much practical good. The assistance and cooperation of the local bodies, District and Taluka Boards and Municipalities, in this behalf could be enlisted with ease. Another body of persons who should be employed to carry out these measures are the **ex-perganah** officers—the Deshmukhs and Deshpandes. They represent the old landed aristocracy of the province. They

wield a large influence within their sphere and it would be only proper that it should be freely utilized to improve their lands and incomes as well as those of their neighbours. At one time they were the revenue officers of the province but now they are only political pensioners. They are looked upon as a link between the Government and the people; and no agency could forward the measures for the improvement of agriculture better than these ex-perganah officers. Government could enlist their aid and cooperation for the mere asking as the status of those persons is likely to be elevated by Government taking them into their confidence.

. MANURES.

48. Next after the selection of seeds comes the question of manures. The province of Berar is pre-eminently a black soil tract and Mr. Clouston is of opinion that "black cotton soil is especially deficient in nitrogen." The deficiency has to be made good by manures. These are of two kinds, (1) bulky manures such as cattle-dung, and (2) artificial manures such as saltpetre. The former is known to the agriculturist and the latter requires to be made known. The first acts slowly and the second quickly.

49. Although the Berar cultivators have been using cattle-dung manure to a certain extent, yet there are reasons to believe that they have not fully appreciated its value and importance. For the larger quantity of cattle-dung is made use of as fuel. It is doubtful if the ashes of the cattle-dung so freely burnt are carefully preserved and used as manure. In view of this fact it is necessary to bring prominently to the notice of agriculturists that "the manurial value of the ashes of cattle-dung is shown to be considerable in comparison with no manure. The ashes appear to be almost equal in value to one-third the dung from which they were derived. Two-thirds of the value of the cattle-dung is therefore lost when it is used as fuel. This means a loss of Rs. 14 per 160 maunds. It is very questionable whether the fuel cakes made from this quantity of dung would be worth this sum."

50. Land in Berar has been under cultivation for age and has naturally suffered in its productive powers. It will continue to do so unless it is sufficiently manured with cattle

dung. "In cattle manure, intelligent farmers in any country should recognise a cheap product of the farm that is always available in arable cultivation, which will produce good crops, gradually enrich the soil and improve its physical texture." Experiments tried at the Nagpur farm have proved that "land manured from year to year with cattle-dung restores its fertility. Bulky organic manures of this type (cattle-dung) have, therefore, a definite value quite irrespective of the results they produce in the year of application, for the land to which they are applied acquires a fertility which it would take years of cropping to exhaust. It would be difficult to state the money value of fertility acquired in this way but it certainly has a very real value as every practical cultivator knows." The experiments have further established the fact that for black cotton soil ordinary cattle-dung is the cheapest manure. "The results for four years show that cattle-dung gives better results than any of the other manures in the year in which it is supplied and that the cumulative effect of its residues is also greater.

51. In addition to the bulky manure of slow action it is necessary to apply artificial manures of quick action to secure a full cotton harvest. Experiments have proved that for the black cotton soil an artificial manure rich in nitrogen can be applied with profit. For cotton nitrate of soda and sulphate of ammonia are considered the best fertilizers. It must not be forgotten that these quick-acting fertilizers have disadvantages of their own. They exhaust the soil in a short time. To prevent this the simultaneous application of cattle-dung is needed. "The ryot should be at least able to apply it (cattle-dung) to his cotton crop at the rate of one ton per acre. The ryot who will supplement this natural fertilizer by a top dressing of about one maund (82 lbs.) of nitrate of soda, immediately after the plants are thinned out, will find that his profits are enormously increased thereby."

52. For the improvement of Cotton fibre the manure of potash is considered especially suitable. Mr. Clouston has noted in his paper on Fertilizers for Cotton that "the coarseness of fibre would seem to be due rather to the absence of potash than to the presence of nitrate of soda. The cotton grown on all four plots to which potash was applied is classed as fine. This may be taken as something more than a

coincidence, corroborating as it does the results of American experiments which prove that potash manures improve the quality of the lint."

53. The methods of conservation of cattle-dung manure are defective and faulty and these require to be improved as stated below :—" (1) The urine as well as the more solid excreta should be preserved ; (2) the manure should be stored in pits and always kept moist, but should never be allowed to get over-soaked ; (3) the manure should be well rotted before it is applied to the land."

IMPROVEMENT OF PLOUGHS.

54. "We do not advocate new ploughs," said Mr. John Kenny at the First Indian Industrial Conference. But even if this be not advocated, it is necessary to try them side by side with our local indigenous ploughs and ascertain the results of their working. English ploughs have been, in recent years, exhibited to the Berar agriculturists but they have not been worked in a manner so as to drive home their superiority in practical working. The English plough goes deeper and produces better results but its adoption is beset with practical difficulties. First, its price is very high. Secondly, should it get out of repairs the local village smith is unable to mend it. Thirdly, it requires more power to work it than the country plough. It is, however, necessary that the implement and its working should be exhibited on a larger scale and the ryot enabled to test its effects. I would suggest that a plough should be supplied to each taluka, and that it should be worked at first in the central villages for a week every year. The cooperation of local revenue officers to carry this out could be enlisted. Other improved implements and agricultural apparatus should also be supplied and worked out with the aid of the same agency, without telling the ryot that "his ancestors for thousands of years were all wrong in their ideas of ploughing and sowing and agricultural work in general." Much could be done to improve the present methods as well as implements by the exhibition and trials of the new ones.

SUPPLY OF CAPITAL.

55. Like the United Provinces, Berar is a province "of

small holdings and high interest ; the cultivator himself has little or no capital and the rate of interest is prohibitive." These circumstances handicap many a cultivator wishing to improve his soil and cultivation. Want of capital has been a great difficulty to the cultivators all over India and Berar is not free from it. The cultivator is always in debt. He makes over the harvest to the creditor and carries on his future operations on fresh advances received. Oftentimes he pledges his future crops to enable him to carry on the agricultural operations of the season. This method of raising the loan is known by the name of Laoni and under it the agriculturist practically sells his crop at a rate less by far than that obtaining in the market. No attempt has yet been made to save the cultivator from this plight. In other parts of the country efforts have been made in this direction both by Government and the people and these have proved successful to some extent. The establishment of cooperative credit societies is a measure which has given relief to the agriculturists in those parts of India where they have been thriving. In Madras these societies have done a very useful work. People have heartily cooperated with the Government in making popular the work of the societies. It would appear that they had a nucleus of the new societies in their old Nidhis. Even the money-lending classes there have come forward to advance the cause of the cooperative credit societies. Says Mr. P. Rajagopalachariar :—" I have seldom met with opposition from this class and in a great many cases they gave me active help in starting these societies to their pecuniary detriment." The remarks of the Hon. Mr. A. E. Castlestuart-Stuart are still more encouraging. He says :

The fact that the rural money-lender and local Nidhis have shown themselves friendly to the young societies is encouraging and there is not the least reason why they should be otherwise. In this Presidency, the large majority of money-lenders are not professional Shylocks unconnected with the land and with no local interests ; but are for the most part the leading agriculturists of villages who by superior intelligence and enterprise, have risen to the position they hold as the financiers of their poor brethren. The rates of interest they charge for loans are, by no means, as a rule, exorbitant, having regard to the security offered. The Madras Sowcar has played and is playing a useful and important part in village life and there is no reason why he should not, as a member of

his village cooperative credit society, play an even more important part in the future."

56. The Marwarees are the most prominent money-lenders in Berar. But they, too, have become large landholders owing to their long domicile in the province as also in consequence of the nature of the transactions they carried on. The firms of Shri Ram Shaligram, Raja Gokuldas and many others are no longer mere money-lending shops. They have become holders of extensive tracts of good land all over Berar. Even among the Kunbi and Mahomedan agriculturists has grown up a class of persons "who by superior intelligence and enterprise have risen to the position of the financiers of their poor brethren."

57. It would thus appear that the conditions of Berar are not quite unlike those of Madras where the credit societies have been flourishing so well. They would thrive in this province, too. A few have been established in the Akola District. But they could hardly meet the requirements of the province, and it is necessary that there should be quite a number of them all over the province. This is a work in which the local leaders, the Industrial and Agricultural Associations, the Government, and the so-called 'Lokamanyas' and 'Deshabhaktas' are alike interested. Persistent and continued work to this end carried on from one end of the year to the other will result in far-reaching beneficial results.

58. As observed by Mr. W. H. Moreland, "The provision of cheap capital is very much the most important agricultural improvement that can be suggested. The capital required by the individual cultivator is small but the aggregate amount required is very great; while the supply must be made promptly and on terms that the cultivator can accept." Such a provision could be secured by the establishment of the credit societies, and I appeal to the local members of this Conference to take early steps to start them on an extensive scale in our province.

59. Addressing the elite and gentry of the Yeotmal district the Hon. Mr. R. H. Craddock, the Chief Commissioner, has said, "There are many things which the Government cannot do without your help and there are also many things which you cannot do without the help of the Government. If there

be cooperation between the two, what great results might not be achieved in agricultural improvements, in industry and in education." Let us all then combine, and, as the poet has said : " Act, act in the living present, Heart within and God overhead, " to achieve these ends.

THE WEAVING INDUSTRY.

By KHAN BAHADUR BEZONJI DADABHOY MEHTA,

Manager, The Empress Mills, Nagpur.

It is generally believed that the hand-loom weaving industry is doomed. I am not so pessimistic as that. Indeed, I am confident it is capable of great expansion. What is wanted is education and organization. Those who use hand-looms are almost all illiterate and ignorant and extremely conservative. They look upon everything new with suspicion and they are entirely in the hands of 'sowkars' depending upon them for the purchase of raw materials and for the sale of their finished articles. They are content with making only a very few descriptions of cloth, and when the market for them is overstocked, they express themselves helpless and unable to go upon other descriptions for which there may be a good demand.

It is, therefore, necessary that weaving schools should be established, wherever possible, not only to teach the art of weaving, but also to read and write. They should be for the special benefit of the children of weavers, though any others willing to learn may be freely admitted. It would be idle to give any instructions to grown up people. They may, however, get hints from their children's education and quietly try new methods. But to go to them personally and ask them to adopt certain methods would be fruitless ; at least that has been my experience. It is possible, however, that they may learn something from exhibitions which might be held in these schools, from time to time, even prizes being offered for new designs or excellent work.

By organization, I mean that the principle of cooperative credit societies might be carried further. Cooperative weavers' societies might be formed, which might buy raw materials and sell finished articles on behalf of members or

others who may wish to benefit by its rules. The society may obtain information as to where the best raw materials at reasonable rates could be had, what the materials are, what finished articles are most in demand, and where, and supply such information to the members. Of course, it may also advance the necessary funds. Each individual weaver must be left free to make what he pleases, and as much or as little as he pleases.

I am against the factory system and, if it could be avoided and the independence of workers preserved, the co-operative society would be conferring a great boon. My objection to factory system for hand-weaving is that a factory has specially to be built and machinery provided by a capitalist who would have to expect interest and profit on the venture, while the hand-weaver will lose his independence and work only during his master's pleasure and at stated periods of time, and would have to be satisfied with such wages as may be fixed by him. In such a case the members of his family may not be able to help him in the same way as they would at home, while he would have to feed them from the wages he would earn. Besides, weaving at home may be practised as a secondary occupation, as is the case with the agricultural class ; while temporary workers in a factory would scarcely be encouraged.

I consider hand weaving is capable of competing favourably with power weaving in a factory. A hand-loom costs a modest sum of Rs. 10 to 15 whereas a power-loom costs Rs. 900 to Rs. 1,000 in these days, including land, building, engines, boilers, etc. Depreciation and interest amounting to at least 10 per cent. upon this sum has to be provided, the capitalist has also to earn a dividend. Weavers' wages have to be paid, fuel, stores and many other charges for sophistication and finishing of goods, excise duty, etc., have to be provided for, whereas a hand weaver has his wages as the only profit to reckon upon. His stores cost very little. The only thing against him is production.

Many improved hand-loom have been put into the market with a view to obtain increased production. The fly-shuttle has been rightly given the chief importance. The fly-shuttle is good where certain class of weaving has to be done, but where

coloured weft with separate shuttles for borders is necessary, the old hand-loom is found to be the best. Then there are several descriptions of cloth of various designs which can only be made best on hand-looms and where production is of less importance and in this case, too, the ordinary loom is found to be the most suitable.

The inventors of improved looms, in their zeal, forget that every mechanical addition not only complicates the simple machinery now in use, but that it adds to the weight which the weaver has to move with his hands or feet which are not as physically strong as of well fed people engaged in other occupations. It is, therefore, necessary that the simplest and lightest appliances should be the aim of every inventor. What is called the Serampore loom is said to be the best in this respect. It has been proved in competition that with certain hand-looms, half the production of the power-looms can be obtained. This would be a great step forward. The Government of Madras on Mr. Chatterton's recommendation, are about to hold an exhibition of improved hand-looms and it would be worth the while of those interested to visit it. What is now wanted is an improvement in the method of winding, warping, and sizing. There is a great deal of time and labour wasted in these processes. If these could be saved, there will be a great gain in hand-weaving. If ready-made sized beams could be obtained from the spinning mills, it would be easy to weave them. Some of the jails do so and the work done there fully competes with the power-loom manufactures. Objection is taken to this method by ignorant weavers on the ground that there would be no work for their family members. This seems childish. I would say, have more than one loom in your house or as many as there may be members of the family capable of working them. Women and children of 12 or 14 can easily manage simple hand-looms. In this way, the production by a family would be trebled or quadrupled and the whole family would earn better wages and in a way, beat the power loom production turned out by one man in a factory. Generally, a factory weaver considers it degrading to have his family members, especially females, working in a factory, while at home he would not be ashamed to have them all working.

For various descriptions of cloth, it would not be possible to obtain always the right sort of sized warp from the mills. In such a case, the cooperative society may have a small factory, which is a necessity in such a matter for winding, warping and sizing only of yarns of English or other makes, and supply ready-made warp beams to their members.

In this manner hand weaving may be advantageously carried on on an extensive and paying scale and thus find employment for numberless people.

THE SALEM WEAVING FACTORY.

BY ALFRED CHATTERTON, ESQ.,

Director of Technical and Industrial Inquiries Madras.

In the present paper I propose to give a brief account of the origin and objects of the hand-loom weaving factory which was established early last year in Salem under the orders of the Government of Madras. This factory has attracted a great deal of attention not only in the Madras Presidency, but in all parts of India. Unfortunately, however, its aims and objects have been misunderstood with the result that the work done there has not exercised that influence over the movement in favour of reform in the methods of the hand-weaver which we think it is entitled to and which in the interests of the Indian weavers themselves it should.

As far back as the year 1900 my attention was drawn to fly-shuttle looms as an improvement over native hand-loom by the then Deputy Superintendent of the Chingleput Reformatory, and in the following year I set up about half a dozen fly-shuttle looms in a shed in the School of Arts, Madras, with the object of getting experience as to their working capacity and data regarding their possibilities. I was aware of the existence of the large weaving establishments on the West Coast belonging to the Basel Mission where fly-shuttle looms are exclusively used and as Inspector of Technical Schools in Madras, I knew a number of mission institutions where weaving with fly-shuttle looms was taught. But in every case the work done on the looms was with comparatively coarse counts and the goods turned out were invariably copies of

the Basel Mission work. So far as I was aware no attempt had ever been made to turn out purely indigenous cloths on fly-shuttle looms, and it was to achieve this object that I began the investigations. From enquiries in Madras I found that some attempts had been made by people interested in the piece-goods trade, but that nothing had come of them and a Muhammadan firm, Messrs. Hajee Mahomed Badsha Sahib & Co., showed me the results of a very extensive series of experiments they were undertaking in the manufacture of Madras handkerchiefs with the domestic hand-loom manufactured by Messrs. Hattersley & Sons. As their experiments had ended in failure they lent me some of the looms with which to make further experiments, and these looms may still be seen in the School of Arts, Madras, among the discarded relics of our various weaving experiments.

At the outset Madras handkerchiefs were taken up, and for two or three years we made great efforts to improve the various details of their manufacture in the hope of being able to turn them out at a profit. At first the handkerchiefs fetched poor prices, but latterly we were able to command the highest rates paid for them. Attempts were also made to introduce the manufacture of these handkerchiefs into some of the Industrial schools, but in every case the experiment ended in failure, and at the end of 1905, after carrying on the work for nearly five years it was found impracticable to make the fly-shuttle loom a success on the lines along which we were working. We had, however, definitely ascertained that it was practicable to turn out a much larger percentage of cloth on a fly-shuttle loom than on the native loom, that a cloth of even better texture could be produced, and that if the sizing processes could be improved there seemed to be some hope of the fly-shuttle loom coming into general use throughout the country. Our want of success was largely due to trying to do many things at one time, and to the difficulty of getting good weavers to work regularly in the weaving shed.

In August and September 1905, I made a tour through Bombay, the United Provinces and Bengal and in passing orders on my report the Government of Madras expressed their willingness to establish a hand-loom weaving factory for experimental work either in Salem or Madura. For a variety

of reasons the former town was selected and in February of last year the looms and apparatus with which we were working in Madras were transferred to Salem and a new start was made. Salem was selected, because according to the Census reports there were over 8,000 hand-weavers in the town who were supposed to be in a more or less chronic state of poverty, because the climate was considered suitable, and finally because it was conveniently situated in regard to access from Madras—a matter of some importance in connection with the supervision of the factory. All the experience gained in running the looms in Madras was made use of in considering the lines upon which the Salem weaving factory was to work.

The weaving problem was obviously a much more complicated one than was dreamt of by Mr. Havell, who since 1901 has persistently advocated the substitution of the fly-shuttle loom for the native hand-loom, claiming that if that was done all would be well with the weavers, that their output would be doubled, and that they would gradually regain the enormous volume of trade which has been surrendered to the power-loom weaving factories. Optimism is essential if one is to endeavour to raise the status of the hand-industries of India, but it must be based on a practical knowledge of the possibilities of each industry and not the result of ignorance. The dilettantism of the artist is a poor equipment with which to endeavour to solve the economic problems which the Indian manufacturer has to face, and the weaving factory at Salem was started with a perfectly open mind as a centre for experimental work in the weaving industry, and without the slightest idea of using it to furnish data to support previously formed conclusions.

In a report on the results of the first year's working of the factory which was submitted to the Government of Madras I have explained that it is an experiment to ascertain whether it is possible to improve the condition of the hand-weavers in Southern India—

- (1) by substituting for the native hand-loom improved hand-looms which will enable the weaver to produce a greater length of cloth in a given time without in any way sacrificing the

essential characteristics of native hand-woven goods ;

- (2) by introducing the factory system among the weavers, so that they may work under the management of men with commercial and manufacturing experience, and so that capital and organisation may be introduced into the industry to render the hand labour more productive ;
- (3) by introducing, if possible, improved preparatory processes to diminish the cost of the preliminary warping and sizing which the yarn undergoes before it is placed in the loom.

From this it will be seen that the weaving factory is not a school for imparting technical instruction in the trade, but is simply for solving certain problems which have been definitely formulated and the future action of Government in regard to the weaving industry will largely depend upon the kind of solution which is arrived at. With the first set of problems and the third set no one, I think, will disagree, but a great deal of opposition has been raised to what is characterised as an attempt to introduce the factory system with all its squalor and ugliness into what has hitherto been an artistic handicraft. If the hand-weaving industry is to be materially improved, a great deal has to be done not merely in connection with the technical details of the weaving processes, but also in connection with the training and education of the weaver himself. In the design of woven fabrics there is immense scope for artistic skill, but the production of these fabrics in the loom is a purely mechanical operation and the hand-weaver is an artisan and not an artistic handicraftsman. The production of solid bordered cloths is still beyond the capabilities of the power-loom and for the very finest work the native hand-loom is still supreme ; but for the bulk of the textile fabrics required by the people of India the power-loom represents one method of manufacture and the question which has yet to be answered is whether ultimately it will not represent the only method of manufacture.

Those who study the weaver in his house amid his ordinary everyday surroundings, often short of work and nearly always in the hands of the cloth merchants, in the bazaar, see little of the independent artisan who is to be the industrial backbone of this country, but much of the misery and poverty of his lot. With the assistance of his women and children he ekes out a miserable existence, and his seeming independence is merely indolence and aversion to regular work. The imagination of the artist casts a glamour over the wretched isolation of the weaver and would have us leave him to fight a losing battle against the products of one of the largest and best organised industries in the world telling him to work with tools which have been discarded in other countries as inefficient. The purchasing power of money in India is steadily decreasing and in most of the other trades and industries the earnings of the workers are increasing. In the weaving trade at best they are stationary and in many places are on the decline. Will the hand-weaver survive the stress of competition or will he be driven as in other countries to seek a livelihood at other work? The answer is doubtful. The fact that he has survived so long is in his favour and there is no doubt the transitional period can be prolonged, but it is still an open question as to whether he can be put in a position which will enable him to command the same wages for the same number of hours of work as the power-loom weaver, or the blacksmith and carpenter, whose industrial existence is not threatened by the prospect that ingenious machinery will be devised to supplant them. On all these questions, I have in respect to the weaving factory endeavoured to preserve an open mind and it has only been called a factory and organised on factory lines, because it seemed to be the simplest way of testing the efficiency of new methods of working and of training a certain number of weavers to carry on industrial experiments to a definite commercial conclusion. As a Government institution one can hardly hope that it will be a great commercial success. Experimental factories cannot be run on purely commercial lines and there is no chance of establishing any sort of a monopoly which might enable us for a time to obtain unusually profitable work.

So far at Salem we have not had time to tackle any

technical problems connected with the hand-weaving industry. All our time has been engaged in getting together a sufficient number of capable hand-weavers to really test the capacity of the various looms which have been brought to our notice. We have found that the hand-weavers of Salem like the hand-weavers of Madras object to working in the hand-weaving factory, and although their wages are good their attendance is unsatisfactory. This is mainly because the weavers prefer to work in their own homes assisted by their women and children and dislike being subjected to the discipline and regular hours of working which must necessarily prevail in the factory. Although the men can earn considerably more than they do in their own houses and are ensured regular and continuous employment, they much prefer the old system and seem to find steady employment extremely irksome, but few of them are free agents and nearly all are in the hands of the cloth merchants who from time to time make them advances and receive the cloths they manufacture. Naturally these gentlemen view the experiments at the weaving factory with suspicion and their influence has all along been against us. So far, therefore, we have had to work mainly with waifs and strays of the weaving community, and the Assistant in charge of the factory has had a long and tedious task in getting into it even some semblance of order. Private individuals however, have watched our efforts, imitated our methods and met with a much greater degree of success and without any special advocacy on our part a considerable number of hand-weaving factories have been started in various parts of the Presidency, but with what degree of success I am not able to state. The interest in hand-weaving is mainly due to the Swadeshi movement and most of these factories owe their existence to the enthusiasm engendered at the birth of a new political movement. Whether, in the long run, they will hold their own or not, and whether, in consequence, they will grow in size and multiply in number, remains to be seen. Comparatively recently there has been a great development in the use of cotton checks for native clothing and it is largely to supply this demand that most of the factories were started. The pioneer work in this direction was done by the Basel Mission weaving establishment, and it is not improbable that if the demand

continues to grow to any great extent the power-loom weavers will try to cut into the business and possibly with success. In Madras, at any rate, there are two large hand-weaving factories in Tondiarpet, both of which are manufacturing mainly Madras handkerchiefs, and in this direction the proprietors assure me that they are doing better than with native hand-loom, but as no accounts are available it is difficult at present to tell whether they have succeeded in placing these factories on a firm commercial basis, or whether they have achieved little or nothing more than has been done in the Government weaving factory. One result of our work at Salem during the last 18 months is to furnish fairly reliable data for the opinion that the weaver himself is not likely within any reasonable time to change his methods of working and take to the fly-shuttle loom and it seems almost certain that in this part of India the factory system will have to be introduced if anything is to be done. In the North of India, especially in the United Provinces, from enquiries which I have recently made it would seem that the weavers there are more likely to take to improved looms on their own initiative and it does not seem to be altogether hopeless that there the difficulties connected with the establishment of the hand weaver in a sound economic position may be solved through the agency of Weavers' Guilds or other forms of cooperative enterprise. It is not my intention now to discuss these questions and I have merely mentioned them to indicate that in different parts of India it is quite possible that the weaving problem will be solved in different ways. A scheme which may be successful up north will prove a complete failure down here and *vice versa*.

I freely invite criticism of our methods of working and of the way we are tackling the weaving problem, but I deprecate all criticism which is based on ignorance of our local conditions. In Conjeeveram, a large weaving centre, at no great distance from Madras, the National Fund and Industrial Association have endeavoured to popularize the fly-shuttle loom, and I have assisted their efforts in so far that I have with the consent of the Board of Revenue lent them six fly-shuttle hand-loom, but the experiment has not been productive of any satisfactory result and the National Fund and Industrial Association have failed to popularize the fly-shuttle loom not-

withstanding the fact that they fully recognise its merits. Similarly in the town of Madura, where the weavers are more enterprising than in most parts of the country numerous experiments have been made with fly-shuttle looms and I have seen the most improved types of European hand-loom such as the domestic loom of Messrs. Hatterseley & Sons at work in the bazaar, but none of these looms have caught on and plain weaving to-day is done in Madura much in the same way as it was more than a hundred years ago. It is not the expense which a good fly-shuttle loom entails which stands in the way, for in places where looms have been lent there has been no eagerness on the part of the weavers to avail themselves of the loan. Finally our experience in Salem itself is dead against any idea that the fly-shuttle loom can be popularised among the weavers themselves. They are ignorant and conservative and in their eyes the doubtful merits of the fly-shuttle loom are insufficient to make them change their ways of working. As the result, therefore, of our work at Salem and of the observations which I have been able to make whilst touring through other parts of the Madras Presidency, I am of opinion that the only hope of progress in this part of the country is that outsiders will put their money into the trade and that through their intelligence and energy it will be placed upon a new footing.

In connection with weaving in fly-shuttle looms the opinion has hitherto generally prevailed that fine cloths cannot be woven on looms fitted with the fly-shuttle attachment, because owing to the greater strain only comparatively coarse yarn which will not readily snap can be used for the warp. This opinion has absolutely no foundation in fact, as where the fly-shuttle looms are designed for working in fine counts no difficulty has been experienced. The great bulk of the work done in the Salem weaving factory is in counts between 60's and 100's and I should not have the least hesitation in undertaking work in higher counts if the orders were sufficiently large to make it worth while. The fly-shuttle loom, no matter what type, must be constructed to suit the work for which it is intended and a loom which may do very well for dungries or checks may be unsuited for fine counts, and it is mainly owing to the neglect of this point that fly-shuttle weaving has

made so little real progress among the Indian weavers.

From the time when these experiments in weaving were first started a great deal of attention has been paid to the various forms of loom which have been placed on the market and any pattern which offered the least promise of success has been thoroughly and carefully tried, and I propose briefly to state the results of the observations. Work was started on hand-loom of the pattern generally found in mission schools in the south of India and it was found in such looms that although the fly-shuttle enabled the rate of picking to be greatly increased yet the increased time spent in mending broken threads in the warp almost entirely nullified its advantages. One by one the defects of this loom were remedied, the proportions were changed, the warp beam mounted on springs, an automatic take-up motion was introduced and the picking string carried over a guide pulley with the result that at the present time it can hold its own in fairly fine weaving against any loom which has so far been brought to my notice. In this loom there is nothing absolutely novel. It has simply been proportioned in its various parts to suit the work to be done and care has been taken to prevent its becoming complicated. For instance, whilst we were engaged in making Madras handkerchiefs in which several colours are used in the weft it was thought that possibly the English drop box might prove a convenient addition to the slay but in practice it was found to be no great advantage and the use of the drop box was discontinued. In the English hand-loom, as in the native hand-loom, the picking motion is independent of the treadles which control the shedding motion and the weaver must learn to jerk the picking string with his hand when he has opened the sheds sufficiently through the levers controlled by his feet. The loom is in no sense automatic, but it is possible when the picking strings are carefully adjusted to make from 80 to 100 picks per minute through a warp 54" wide. At the present time at the Salem factory where we use nothing but country warps sized by hand and provided with a lease and lease rods, to avoid frequent stoppages to shift the lease rods a fairly long spread of warp between the warping beam and the healds is necessary, and this is the most serious objection to this form of loom inasmuch as it makes it very bulky.

It became obvious at a very early stage in the experiments that the fly-shuttle slay could be used in the native hand-loom, and that we could improve the rate of picking. I am not now certain to whom the credit of first making this suggestion is due, but it is a very important one, as it places in the hands of the native weaver a very great improvement in his loom, and one which can be obtained at a very small expense. This modification has been largely tried and with considerable success, but it does not secure all the advantages of the frame loom pattern and is to be regarded rather as an intermediate stage between the Native and the English loom. Experience has taught us that the greatest defect of this loom is the number of broken ends which occur in the process of weaving, and these have been much reduced by putting the warp on an elastic frame and by using brass reeds and healds with metallic eyes. The healds and reeds we employ are obtained from Messrs. Jones Brothers of Blackburn, England, through their agents Messrs. Hutheesingh & Co. of Bombay. They are considerably more expensive than native healds and reeds, but those who have given them a fair trial consider that they are worth the money. It is not an uncommon custom for native weavers to vary the closeness of the texture of their cloths by using reeds set much closer together near the edge of the cloth than in the middle. The practice, if not actually fraudulent, is not to be recommended, as it is calculated to deceive the unwary, but it is widely in vogue and is likely to render English reeds unpopular unless they are made to conform to this practice. The automatic take-up motion is not an essential feature of the loom, nor is it a very popular one with native weavers, but it enables the weaver to produce cloth of a perfectly uniform texture, and I am quite certain is fully appreciated by the weavers of such cloths who find them more durable. The cost of this loom complete varies with the amount of timber put into it, the quality of the timber, and the general style and finish. Complete with English healds and reeds it will not cost more than Rs. 100 and in large numbers can be produced for a somewhat smaller figure. In our experimental workshops we have made a good number of these looms and we sell them, exclusive of healds and reeds, for Rs. 85 each. These looms are purchased more as

patterns to be copied than as actual working looms and our price is perhaps somewhat high.

I do not propose to furnish a dissertation on weaving mechanisms, but before discussing the results obtained with other types of loom it may be well to explain that in all the improved hand-loom mechanism is provided whereby the picking and shedding motions are combined, and the weaver is reduced to a pure automaton who either works the loom through a pair of pedals or sets the mechanism in motion by causing the slay to swing in pendulum fashion by one or both hands. The weaver is a mere automaton so long as everything works well, but if anything goes wrong or if the driving force he supplies is insufficient a break-down always occurs and his skill as a weaver will be called into play in repairing the damage done.

During the last few years the discussions about the hand-loom weaving in India have led many people, competent or otherwise, to attempt the improvement of the hand-loom, and many worthless patents have been taken up. During the last six years I have had under observation every loom that I have heard of which seemed to offer the least prospect of turning out successful, and the following is, I think, a complete list of the looms which have been tried :—

- (1) The domestic hand-loom of Messrs. Hattersley & Sons.
- (2) The Domestic loom of Messrs. Raphael Brothers.
- (3) The Japanese hand-loom.
- (4) Mr. Churchill's loom (Ahmednagar).
- (5) Captain Maxwell's loom (Salvation Army).

I had the Hattersley's looms at work for a long time on a great variety of fabrics made from yarn of counts up to 40's, but the output was never satisfactory, as the work of driving the loom was far too heavy for the native weaver. For a time I tried them putting two weavers for each loom so that when one worked the other rested and this naturally increased the output but not to the extent that was to be expected. When the loom is driven at a perfectly uniform rate, it works very satisfactorily, but when the source of supply of power is

an Indian weaver, the supply is very irregular and the result unsatisfactory.

The Raphael loom was never actually at work in either the Madras or the Salem weaving shed and my knowledge and experience of its working is gained by observations made on the loom purchased by Mr. Theagaroya Chetty of Tondiarpet. This loom suffers from the same defects as the 'Hattersley' loom and is much too hard work for the undeveloped legs of the Indian weaver. To all intents and purposes both these looms are power-looms and unquestionably better work will be got from them if the treadles or pedals are done away with and an arrangement made to drive them off a line of shafting. The looms are made of cast iron and it is astonishing how easily the castings are broken and how helpless the Indian weaver is in face of even a simple fracture. These looms are totally unsuited for individual weavers working on their own account, and I fail to see what advantage there is, if they are gathered in large numbers in a factory and human labour is employed to drive them. Thirty or forty such looms can be driven by a small oil engine costing not more than Rs. 4 or 5 a day to run and there is not the least doubt that the output of these looms will be three or four times as much as when worked by hand labour. I am inclined to think that small power-loom factories of this type might be worked with great success in this country and would afford an admirable training ground for the development of indigenous manufacturing genius. I am now dealing with hand weaving and it will be out of place to discuss this suggestion any further, but I think that small power-loom factories of this kind would prove very successful if properly designed and worked on the right lines.

With the Japanese hand-loom my experience was very unsatisfactory. It was obtained from Mr. Shafi through the Ludhiana Loom Manufacturing Company, and was found to be a crude and ill-designed loom and no warp ever put into the loom was woven into a satisfactory cloth. Why the loom was brought from Japan to India I do not know and the sooner it sinks into the obscurity from which it was dragged the better. I have been told by Japanese connected with the weaving

trade that the loom is not used in Japan, and I am not surprised as at the best it is only suitable for very coarse work.

Mr. Churchill's loom.—When I visited the American Mission Industrial School at Ahmednagar in 1905, Mr. Churchill showed me a number of his looms at work on a kind of dungri, and I was much struck with the results obtained when weaving this kind of cloth. Subsequently Mr. Churchill built six looms for the Salem weaving factory to weave fine cloths from 45" to 54" wide. On such work the loom has not been a success and the Salem weavers object to being put to work on it. The mechanism for timing the throw of the shuttle is defective and the shuttle is very liable to be caught in the warp when it is more than a yard wide. To make the shuttle travel properly the slay has to be moved forward with increasing rapidity and then suddenly brought to rest, and on the finer warps the percentage of broken threads renders the output of the loom much smaller than would be anticipated from the rate at which picking can be done when the warp is not too wide.

The last loom with which we are still experimenting at Salem is that invented by Captain Maxwell of the Salvation Army and known as the "Triumph" loom. I have only one of them at work at Salem with which fairly satisfactory results have been obtained and a second loom has been ordered with some slight modifications which it is hoped will improve its outturn. If this anticipation is realised, it is proposed to put down six more looms and to thoroughly test them on the same class of work against six looms of the English pattern already described.

In the looms of both Churchill and Maxwell the driving force is applied to the slay, and I am inclined to think that, whilst this will work satisfactorily on coarse warps, the necessarily somewhat jerking motion of the slay is not conducive to a good output when the warp is fine. Personally I hold the opinion based on nearly seven years' experience with different types of hand-loom that, when the power-loom is converted into a hand-loom, it becomes an unsatisfactory machine owing to the irregularities in the driving force, and that the hand-loom must be a simple piece of mechanism in which the irregu-

larities of the weaver are compensated for by the gentleness of the action of the loom.

A power-loom will make from 200 to 250 picks a minute, and from careful observations which I have made of the out-turn of hand-loom I find that the daily average has only in one instance exceeded 30 picks per minute, and when weaving fine cloths an average of from 20 to 25 picks a minute may be considered very good work.* Mr. Churchill at Ahmednagar was able to weave 30 yards of dungri in $8\frac{1}{2}$ hours, the warp and weft being of 10's count and the number of picks per inch 28. This is equivalent to an average rate of picking of 60 per minute, and is an extraordinarily good result. I have often observed my weavers at Salem and I find that they can easily do from 80 to 100 picks per minute whilst actually weaving, but their daily outturn under favourable circumstances shows that at this rate of picking less than 25 per cent. of their time, is spent in plying the shuttle and that the rest is frittered away. Weaving is a very monotonous occupation and the weaver is certainly unable to go on picking for any length of time without a change of some kind. The changing of pirns, the repair of broken threads, the shifting of the lease rods and other little incidents break the monotony of the work, but they greatly impair the efficiency of the loom.

I am convinced that, if the fly-shuttle hand-loom is to be largely used in making the finer classes of native goods, the direction in which improvement should be sought for is not so much in increasing the rate of picking which is already quite fast enough but in improving the details of the shedding and the working of the slay so that the operation of weaving subjects the comparatively delicate threads to the minimum amount of strain. The idiosyncracies of the weaver, however, remain and I doubt if, under any circumstance, the average

* These facts are substantiated by the recently issued report of the weaving competition which took place at Calcutta at the Exhibition associated with the Indian Industrial Conference of 1906. The Salvation Army loom, which was awarded the gold medal, was worked at the rate of 37.3 picks per minute for $7\frac{1}{2}$ hours, but at the end of that time the weaver showed signs of distress as did all the other competitors, and it was obvious that the result depended as much upon the endurance of the weaver as upon his skill or the merits of the loom.

rate of picking throughout a day will ever rise to as much as 40 or 50 per cent. of what may be termed the normal rate at which picking can be done. Even in a weaving factory it is very difficult to collect reliable data regarding the working of looms and their output. The conditions vary so much from time to time and the human element plays so important a part that some exceptional motive must be brought into play to obtain anything like uniform conditions. For this reason I attach considerable importance to the results obtained in weaving competitions when a powerful stimulus is supplied to each weaver to do the best he can under the circumstances. Under the auspices of local associations in the Madras Presidency one or two such competitions have already been held, and in February next a competition is to be held which is being organized on much more elaborate lines than any of those already mentioned. The main object of the competition is to ascertain the working capacity of the various hand looms on the market under favourable conditions, but under as far as possible conditions which could be reproduced in a weaving factory. Each competition will last for six days and the results will be judged by the week's outturn. In this way it is hoped we shall obtain reliable data regarding the output of the various types of loom when working on different kinds of cloth. A considerable number of competitions have been arranged for and the Government of Madras have contributed very largely to the prize fund which it is hoped will induce the makers of every practical type of loom to enter them in the competitions.

From data collected at the weaving factory at Salem a tabular statement has been prepared giving details of the cost of production of several kinds of goods most largely manufactured there, and I would draw attention to the columns in which the cost of each item is given as a percentage of the total cost. These figures are very interesting and it would be well if similar figures could be produced from other weaving establishments and the various items discussed. It will be seen that in the very fine cloths like angavastrams and turbans the cost of the raw materials is but little more than a third of the cost of the finished articles, whilst in the goods made in the lower counts the percentage varies between 56 and 60. At Salem the warping and sizing is done outside the factory by men who do nothing else but this sort of work and they use fairly efficient warping mills and from the figures for warping and sizing it is obvious that there is not a great amount of room for improvement. The cost of the actual weaving work is probably the main item in which improvement can be effected and this is emphasized by the figures given regarding the rate of picking which varies from 12 to 23 picks per minute excluding country towels, the figures for which are not given as they are usually made on native looms with a simple fly-shuttle attachment. The item 'warping and sizing' varies considerably with different kinds of cloths and the figures given are probably lower than would be obtained in many other places owing to the fact that in Salem the preparation of warps is to a large extent a special business and is carried out in a much more efficient manner than I have seen elsewhere.

Whilst the experimental plant was in Madras a great many experiments were carried out in different methods of sizing and various forms of hand-warping mill were tried. The problem of preparing warps suitable for use on native hand-loom was laid before the makers of warping machinery at home and after a great deal of discussion a plant was ordered from Messrs. Butterworth and Dickinson. It was set up and tried in Mr. Theagaroya Chetty's factory at Tondiarpet, but the results were anything but satisfactory and on account of other and more important work the experiments are at present in abeyance. The main idea was to employ hand-

sizing and a sectional warping machine capable of turning out cheeses of warp of 500 ends. To make up a warp containing 3,000 or 4,000 ends the requisite number of cheeses were put on a spindle and the required warp run off on to the weaver's beam. The principal defect is in the sizing which proved inferior to that which is done by the native method where the warp is stretched out on a frame and carefully brushed. It is my intention as soon as possible to set up this warping mill again and prepare warps of unsized yarn and then to expose the warp in sheet form and size it according to the ordinary native method. I cannot say that I am very sanguine that this will be a success, but it seems worth trying and should effect a considerable economy in the cost of warping. Recently Messrs. Hattersley & Sons have brought out a hand slasher sizing machine, which will probably give good results with low counts where the hand-loom may be expected to turn out from 20 to 30 yards of cloth a day, but with the much finer class of goods which we are weaving at Salem, where the outturn is seldom more than 5 yards a day, the use of very long warps is not recommended as they remain in the loom much too long a time and the sizing deteriorates so much that the warps have to be re-sized on the loom and, when this is done, it greatly diminishes the outturn.

Before concluding this paper it may be of interest to give some details regarding the factory itself. For the present the factory is located in a rather large straggling bungalow in the middle of the town of Salem for which we pay a rent of Rs. 60 a month. It was intended originally to instal about 100 looms, but owing to the difficulty of getting weavers nothing like that number has yet been reached and we find it difficult to keep more than about 35 looms in full work. The cost of running the factory last year was about Rs. 300 a month in addition to the sale-proceeds which amounted to about Rs. 350 a month. A steady improvement is, however, going on and with between 40 and 50 looms installed and an average of 35 at work the sale-proceeds amount now to over Rs. 1,000 a month and the cost of running the factory to about Rs. 200 a month. Ultimately it is hoped that the factory will pay its own expenses and it can probably be made to do so

now were commercial considerations of paramount importance.

To the capitalist who puts his money into a hand-weaving factory it is essential that a profit should be earned and as that is not done at Salem it may be well to indicate briefly why such a desirable result has not been attained. In the first place the factory is a Government institution, and it is generally recognised that commercial work cannot be carried on under Government with the same degree of economy as is possible when the control is vested in the hands of private individuals who are keenly interested in making it pay. In the factory we have arrived at some conclusions regarding looms which have already been stated, and if money-making was the object in view, we ought to at once discard all other types of loom and confine ourselves to those classes of work which pay best. New experiments are always being tried, looms are always being altered, the weavers have to accustom themselves to the new conditions, frequently a good deal of cloth is spoiled and generally the efficiency of the institution as a factory is greatly impaired. It is for these reasons mainly then that the factory does not pay and those who examine the accounts must take these facts into consideration. If some of the gentlemen who have interested themselves in hand-weaving and have started hand-weaving factories could be induced to furnish accurate manufacturing accounts, they would be of great value, but it is hardly fair to expect business men to give away the results of their experience and those who would like to find out whether the investment of money in hand-weaving factories is likely to be a success, must examine the published accounts of the Salem Weaving Factory in the light of my remarks.

THE HAND-LOOM IN AHMEDNAGAR.

BY D. C. CHURCHILL, ESQ., *Ahmednagar.*

In this paper I shall try to give some of our attempts and results with work with the hand-loom in Ahmednagar.

In January of 1902 I received a commission from the society which I represent to "find or produce" a hand-loom

which will be suitable for the weavers of the Ahmednagar District. This was for the purpose of starting a school of weaving which, should lead eventually to a livelihood, for, many of the famine orphans in the care of the American Mission. If you will include the work we have done in the field of warping and dressing, we can say that we have been at work to carry out that commission ever since.

Before purchasing any looms I visited the Madras School of Arts and the Basel Mission Weaving Establishments in three cities on the Malabar Coast and many other places where other than Indian hand-looms were in use, and largely on account of the opinion of Mr. Chatterton, and because the Managers of the Basel Mission Factories were looking for better looms than the English fly-shuttle (Swiss pattern) which they were then and are still using, I came to the opinion I will not say conclusion—that the chief requisite to make hand weaving in Ahmednagar profitable was a good hand-loom.

We began by the use of an Indian pattern of the English fly-shuttle loom, and subsequently bought two of the Basel Mission pattern. This loom was invented by John Kay in the latter part of the 18th century. It is now made in a great variety of forms and qualities by a great many people, but in its essential principles, those of the shuttle drive and beating up motions, it is the John Kay loom, the forerunner of the power loom, in use for more than a century. It is, therefore, interesting to read Mr. Chatterton's "Supplementary Note on Hand-weaving," accompanying Government Resolution No. 4434, in which he says that he has found no loom better suited to the general run of Indian hand-made cloth than the English fly-shuttle loom.

That is the experience of many men who have laboured long and earnestly in trying to find and introduce a good hand-loom into India. That is also our experience in Ahmednagar. Let us make a profound *salaam* to the memory of John Kay, and wonder why the wonderful, mechanical 19th century did not improve upon the work of his hands and mind in the field of hand-weaving.

"Fools rush in where angels fear to tread." We in Ahmednagar were only beginners in weaving experience, but we soon made up our minds that the loom was not good

enough or fast enough to weave the lugade and sari at a paying rate under ordinary conditions, and as we could find none better in the market we began constructing one in which the picking was automatic yet simple, the shuttle being driven in each direction without the use of cams, springs, pawls, clutches or anything of the kind, the reverse taking place solely through a system of levers with their ends firmly jointed to each other. To reduce breakage, we introduced a spring tension for the warp which has been widely copied on other hand-loom and which greatly reduced breakage. We were able at that time to weave about twelve yards a day of coarse dungri, while with the John Kay type, we were able to weave about 8 or 9 yards. Our looms ran at a speed of 110 picks per minute, and we were using native hand-made warp which was good in quality but which was not well beamed. It then became evident that the product of only twelve yards a day was not due to the lack of speed in the loom but to other things too numerous to mention here but chief among which was the badly beamed and arranged warp. We therefore left the loom largely in the hands of the weavers and applied ourselves to the warp and to making a few changes in the loom as they were suggested by use in the school. In a year the speed had risen to an average of 130 picks and the product per day by one weaver had risen to 23 yards, our best record for any one day being 3 yards. We then made a test covering six months, in which five boys averaged 23 yards per day each during that time. Meanwhile we learned for a fact that no loom alone could put hand-weaving on its feet but that the use of any good loom must be combined with good warping, dressing and pirn-winding apparatus. Many other experimenters in India have come to these conclusions during the past few years and they may now be accepted as a basis on which to build.

- But I shall confine myself to the subject of the loom in the present paper.

In the weaving of coarse cloth of one yard in width we were so successful that when our attempts to weave series of 45 and 50 inches in width, proved little more encouraging than by the use of the English fly-shuttle, we were very much disappointed. Mr. Chatterton about this time purchased some of our looms for the new factory he was about to start in

Salem, but they were ordered of a width beyond any which we had yet constructed, and I pointed out to him at that time that the shuttle drive, while working at a better rate than anything heretofore produced, was based on principles which could never attain the highest speed mechanically possible in a hand-loom. As Mr. Maxwell has adopted this principle in his Salvation Army loom, and as many other experimenters have copied it and will doubtless spend much time and money on it before giving it up as we have ; I might here state its defect.

In such looms (where the motion of the shuttle is derived directly from the motion of the sley) the picking mechanism begins to act when the sley has nearly reached its back position, and the shuttle does not leave the picker until the sley *has reached* its back position. This is just as the shuttle has partially entered the shed.

The shuttle must now make its entire movement across the full width of the cloth during the time that the sley is moving from its back position to its mid-position, and if the sley is moving to and fro with a smooth motion (approximating "harmonic motion," as must be the case if high speed is attained), this time will be about one-fourth of the total time of one "pick," or a complete to and fro movement of the sley. It will therefore be seen that if the shuttle can be made to *start* when the sley is at its *mid-position*, on its backward movement, instead of at its *back position*, it (the shuttle) will have one-half the entire time of one pick for traversing the cloth instead of one-fourth. A *perfectly timed pick* may, therefore, weave cloth of approximately twice the width, at the same number of picks per minute, as a loom working on this defective principle.

A power-loom approximates perfectly a picked loom, as to the timing of the shuttle drive, and the English fly-shuttle loom may be perfectly timed in the same way by a very skilled weaver ; but because of human imperfections and by becoming tired with the monotony and stress of weaving, he loses much of that perfection of timing his movements necessary for fast weaving, and drops to a much lower speed to avoid mistakes.

In Ahmednagar, therefore, we have left these principles,

and believe that we will make progress in hand-weaving by the use of more perfectly adapted mechanical principles.

The direction of our efforts is determined largely because we have become convinced of the following points :—

First.—That the power and skill required to perform the act of weaving light cloth, at a rate which can compete with the power-loom as at present constructed, is entirely within the capacity of a weaver when the advantages of hand-weaving are taken into consideration.

Second.—That the English fly-shuttle loom does not begin to realize the possibilities of hand-weaving as to speed, wear and tear on the warp, and so forth, and that this loom presents too small an advantage over the Indian hand-loom to make the possibility of its superseding the latter at all convincing.

Third.—That for fine cloths there is no better than the English fly-shuttle loom on the market and if the hand-weaving industry is to prosper, there must be a better one and that if a much better one can be found and the Indian warping methods much improved, as most of those engaged in hand-weaving believe is entirely possible and probable, we may expect the continuance and prosperity of the hand-weaving industry for many generations to come.

Fourth.—We believe there has yet been no serious attempt to improve the existing hand-weaving apparatus in India and that the time has come to do it. By “serious attempt” I mean that the energy, ability and equipment necessary to make sound mechanical improvement in a well-founded industry have never been brought to bear on the Indian or any other hand-loom in the way that such energy, ability and equipment have been used to develop the powerloom and its allied apparatus. We believe that such serious attempt, is absolutely necessary side by side, with the study of the Indian weaver and his materials and products : of what he will and will not do and can and cannot do.

Such attempts as those of the Hattersley Company of Blackburn, England, to produce hand machinery have been exceedingly helpful to us here in India. In mechanical perfection it will be many years before we can hope to approach the work of this company, but their set of apparatus with us fails, as it has failed elsewhere in India, because there is no connec-

tion between the makers of the apparatus and the weavers who are to use it, and the former have no appreciation of the requirements, likes and dislikes of the latter, and last, but not least, because the designers are evidently builders of power machinery and not of hand machinery. Their loom is a *power-loom* with pedals, and, when considered as a piece of weaving machinery for a hand worker, is about as near to the mark as one might expect to get if he should order a bicycle of a carriage builder. A phaeton with pedals would be a comfortable thing to sit in and would present a good appearance and workmanship, but the sitter would get nowhere, though the vehicle was intended for transportation only. A bicycle is a light unsafe machine. It will not stand alone. A much too small three-cornered piece of leather serves as an uncomfortable seat, and a delicate rubber air bag, expensive and unreliable, serves as a tyre.

All these defects the public puts up with and pays its money, for because the machine gives cheap and convenient transportation, and that is what it is made for. The first bicycles were made by carriage builders with carriage wheels and like construction. I owned one myself.

A modern bicycle is as far removed from a horse-drawn carriage in design and construction as one can imagine a vehicle to be. The carriage has changed little in thirty years, because it is suitable for its purpose and method of propulsion. The bicycle has been revolutionized in the same time, each successive change—the wire spokes, the ball bearing, the rubber tyre, the tubular low frame, and the pneumatic tyre—having been adopted because the demand was for *transportation* and little else *by the limited power of the rider*. There was no way to increase that power. All that could be done was to utilize it without waste to the full. This has been done, and we have the bicycle as it stands to-day. It is the most perfectly adapted man-driven machine in existence, and we can therefore learn, much that is useful from it when we try to develop another man-driving machine, the hand-loom, the usefulness of which is limited largely because of the limited power available to drive it. Energy, ability, and equipment used persistently over years, have put the bicycle and the power-loom and every other useful machine into

usable form. and we may not expect the hand-loom to be anywhere near perfection until the same thing may be said of it.

With these points in mind I will enumerate some of the principles on which and the directions in which, in my opinion, the further development of the hand-loom may profitably take place.

Any improved hand-loom must be capable of being run all day after day, *with ease*, by an ordinary man, else it will fail. In the design of such a loom the ease of running must be kept constantly to the fore as the most important point—assuming, of course, that good cloth of the kind desired must be produced in any and all cases.

To put it beyond the probability of being soon set aside in competition with the power-loom, it should have a speed approximating that of the latter. Mechanically speaking this is entirely possible, as the power required to put a thread through a shed is insignificant. It is the cumbersome methods and machinery now in use to accomplish this, that demands the power, not the act of weaving *per se*.

It must be adaptable to all ordinary widths and fineness of Indian hand-made cloth.

This does not mean that the same loom must weave all these, but that it ought to be capable of being designed to suit the various kinds of cloth.

If we assert that the English fly-shuttle loom with certain attachments is the best hand-loom now on the market, but that it is too slow, we feel under obligation to point out why, in our opinion, it is too slow and how this can be overcome in any loom which may be an improvement upon it.

We believe it is of necessity too slow, first because the timing of the primary movements relative to each other depends on the precision of the weaver at each event, and experience has shown that this fact very much limits the speed attainable by any weaver, hour after hour, independently of his strength.

Eighty or ninety picks per minute seems to be the rate at which the consensus of opinion places the running speed of a

fly-shuttle loom on a 45 " reed. Our experiments carried on for more than a year with a new type of loom, show that 120 to 130 picks per minute are quite within the capacity of boys and girls for continuous work on a 45" reed, when the three primary movements are mechanically so connected that their relation cannot change.

Second.—The results of the tests in Calcutta last year and

Mr. Chatterton's report this year as well as
2nd.—Occupation of the hands
 in driving the loom. our own experience, go to show that in a day's run practically all of the improved hand-

looms of this type are capable of an "effective" number of picks from one-fourth to one-third the "ideal" number, *i.e.*, the number obtained by multiplying the number of picks per minute by the total number of minutes in the working day. This small percentage of effective picks is due to many causes, but is fairly uniform in amount in those looms which drive the beater to and fro by hand.

The process of hand-weaving requires the use of the hands for many things beside driving the beater and shuttle. Even in the power-mill a man in charge of two looms is fairly busy filling shuttles, mending warp, cleaning cloth of loose ends, &c., though he has no temples to move. In the use of the fly-shuttle loom, whenever any of these things have to be done and we see that they occupy from two-thirds to three-quarters of the weaver's time the loom stops, not because the weaver is tired or because things are in such shape that the process of weaving might not continue, but because the weaver's hands are otherwise engaged. We have, therefore, during the past few months, constructed a loom which is run by the feet on lines determined by more than three years' experiment and trial in this direction. This loom has not been constructed this way for the purpose of running it faster than our old loom in picks per minute, but for the purpose of freeing the hands of the weavers to perform the duties of refilling the shuttle, adjusting the temples, throwing aside a broken end, &c., *while the loom is running*. We have also constructed this new loom and abandoned the old in order to adopt principles which are applicable to the finest yarns and widest cloths.

We are able, in consequence to get effective picks for the

entire day from 50 per cent. to 90 per cent. of the "ideal," depending on the quality of the yarn used.

I mention this here as a counter-argument to those which assert that 80 to 90 "effective" picks per minute are all that are desirable or that are humanly possible in a hand-loom.

As I have said above, I agree with those who think that the John Kay type of loom is the best all round loom at present on the Indian market, but when such go so far as to say that 85 or 90 picks per minute is the proper speed for a hand-loom, and that further attempts are in the wrong direction or unnecessary, I do not agree. Some investigators seem to be against fast picking on principle. The word fast is relative, and it has not yet been determined what is fast picking on a hand-loom. A well-known writer on the hand-loom was the author, some time ago, of an article in a prominent Indian paper in which the loom with which my name has been associated was berated apparently, because he said that it ran at a rate of 160 picks per minute, although, according to his own figures, it had an output greater than any other loom that he had an acquaintance with. I cannot yet see what objection he can have against speed if it produces the cloth. Of course there is a limit to the speed of any loom. If one systematically increases the speed of the powerloom he comes to a place, before long, where the wear and tear of the pickers, boxes, bands, etc., is a greater loss than the increased value of the output. I know of a power plant which formerly ran its looms at 200 picks per minute, and which subsequently reduced the speed to 180 picks and made money thereby, chiefly on account of reduced wear and tear. Will any one say that to have come down to 160 picks would have resulted in a still further saving? Did you ever hear of the Yankee who had stoves to sell and who urged his customer to purchase one, guaranteeing that thereby he would save half his fuel? The customer—he could not have been a Yankee—finally decided to buy two stoves and thus save it all. In the present state of the art, who shall say how fast a hand-loom shall be picked? We have seen that the speed may easily approach that of the powerloom, even with the present kind of cumbersome, power-absorbing shuttle-box, and if some one will devise

a simple mechanical contrivance by which at least a part of the energy of the moving shuttle is stored and used for driving the return pick, he will make possible speed in a man-driven loom beyond the present or ordinary requirements but one mechanically entirely possible and it is a mistake to assume that 80 or 90 picks per minute in a hand-loom is the limit.

To those who insist on the monotony of hand-weaving and the human side, object to making a man into part and parcel of a machine I extend a hand of sympathy. This is an important subject, but has no place here. Certain it is that the lot of the weaver is not going to be made more monotonous by putting within his hands the means of doing his work in half the time. Weaving is at best a monotonous process. It is the same thing over and over again, and there seems to be no emancipation from such a lot if one remains a weaver, except to acquire an education and cultivation and turn one's attention more and more to the production of finer and more artistic kinds of goods. A loom which is good for India will have within its capacity these finer designs also, but this does not mean that a good speed of pick will not be helpful.

This subject, of which the mechanical improvement of the loom is only the introduction of improved looms among the people, is too important to be relegated to a paragraph at the end of an already too long paper and must be considered at another time and place.

HAND-LOOM WEAVING IN INDIA.

By CHUNILAL B. DESAI, Esq., *Barrister-at-Law, Nadiad.*

No question has aroused greater interest in India in recent times than the revival of its weaving industry, and Mr. R. C. Dutt most sanguinely states that "no object has been pursued with a greater determination or more sustained endeavour by the people of India than the re establishment of this industry, which was India's own in the past and which shall be India's own again in the future."

During the last four years, many new mills have been started in different parts of India, and in several cases the

equipment of the existing mills has been considerably strengthened. Similarly the hand-loom industry has not been neglected at all.

There are certain articles of clothing which the power-mills do not produce, and for which we have to depend upon hand-looms.

It is an established fact that a hand-loom cannot stand competition with a power-loom, and this is so, especially with respect to the manufacture of cotton articles. Moreover there are certain articles of cotton, silk, and wool, for the manufacture of which the hand-loom is indispensable, and the hand-loom industry stands foremost in the weaving industry in India, notwithstanding the power-mills.

The Swadeshi movement has given a vigorous impetus to the weaving industry throughout the country. To start power-mills, large capital was required, and this could be obtained only in large commercial towns, and the people, therefore naturally turned their minds to start hand-loom factories which required small capital. Since the people began to take interest in the hand-loom weaving industry, not less than twenty-five different kinds of hand-looms have either been invented or placed on the market. No doubt, some of these have special advantages, but none of them can claim perfection in every respect. The English hand-loom known as "Hattersley loom" is a movement of perfection, but, on the other hand it is a heavy and costly machine and so full of complications that it requires knowledge and skill. Consequently, for the ordinary class of weavers, it is totally unfit. Hence the need for inventing a loom which can have all the advantages of an improved loom and which can cost little was greatly felt. In this respect the Japan loom is considered by some as the best loom, but, in my opinion, this loom is also unfit for the ordinary weaver. It is costly, and at the same time requires some preparatory machines, such as warping, beaming, winding, etc. All these machines not being within the reach of a weaver, he generally would like to go in for a pit-loom, making the warp by hand. If factories on a large scale could be started, then these improved machines and looms might be used with advantage. However, there is one escape from this difficulty, and it is that of starting a warping

factory, in which warps may be prepared and sold to the weavers of the locality. But in this case there should be at least twenty improved looms for one warping machine.

The improved hand-loom is a fly shuttle loom or a modification of the same, and so much has already been said and written by experts on weaving by fly-shuttle that I do not propose to say anything about its working. In the fly-shuttle a plain cloth can be manufactured unless it is provided with more than two levers. In some places these looms are found to have eight levers. But it requires a very clever man to manipulate the machine, and a little mistake committed in touching a different lever would spoil the fabric. This loom also requires special healds for a decorated cloth. These are the main defects in the fly-shuttle loom, which is the only loom that gives a neat and fine cloth. The Japan loom is a machine after the type of the power-loom, and is fit only for coarse weaving. About two years ago the newspapers were full of glowing accounts of the same, and hundreds of these looms were ordered out from Japan. Many such were manufactured with alterations and additions in India. A loom of this type was manufactured by Mr. J. M. Patel, weaving master of the Nadiad Silk, Woollen and Cotton Hand-loom Weaving Co., Ltd, and it turned out to be a heavy machine, and the operative, who was a strong and healthy man, cried that it gave him pain in the chest, and that he could not continually work for ten hours. On account of its heavy working many breakages were caused in the yarn, and the machine had to be stopped every now and then to mend the threads. By a novice in the art of weaving much surprise and astonishment would be felt at seeing the speedy working of this machine. But, as stated above, a Japan loom is only fit for coarse weaving and twisted yarns. To start a factory with all the machines of Japan type would be a great folly and is bound to fail. To get over the defects of the fly-shuttle and the Japan loom Mr. Patel got a dobby to be constructed and fitted on to the fly-shuttle looms. This dobby obviated the necessity of having many levers. Only one lever is attached to the fly-shuttle, and this lever is connected with that of the dobby above with a string. The dobbies are neck-laced with lattices in which holes are driven, in which the hooks of the

dobby fit in, and these hooks have connections with healds below. It is very difficult to describe all the parts of a dobbie, but the Nadiad Silk, Woollen and Cotton Hand-loom Weaving Co., Ltd., has exhibited here such a dobbie loom of medium size and it could be seen together with different kinds of beautiful and artistic fabrics manufactured in the same. The largest dobbie manufactured by Mr. Patel has 300 hooks by means of which any decoration of a size of four inches square could be turned out in the border as well as in the whole body of the fabric. To work such a loom the operative need not be a very clever man. In the Nadiad factory all the dobbie looms are worked by boys under fifteen. In the fly-shuttle loom both the legs and hands of the operative have to be brought into work. But a weaver at the dobbie loom has to work with one leg only by means of which he continually presses the lever fixed below to the loom, to raise the healds and with the one hand he jerks the shuttle forwards and backwards, and with the other hand he beats the sley. The decorations in the dobbie are adjusted by the weaving master, by filling-up the holes in the lattices on mathematical calculations. While the hooks above lift up the healds below, to allow the shuttle to pass through the yarn, the designs appear in the border and the body of the cloth most beautifully woven. Mr. Patel has thus by constructing a dobbie machine with all the advantages of an improved loom, given to the world the best type of factory loom. His sectional sizing and warping machine and his factory dobbie loom are masterpieces of skill and genius and to him the weaving class owe a great debt. A production of ten yards of a dhoti of 80's in ten hours was obtained by a boy, who had practised with the loom for six months only. Such a loom is valued at from Rs. 125 to Rs. 200 according to the size of the dobbie and the number of hooks.

There is another kind of loom which is called the "automatic" loom, but from personal experience I can say that it is fit only for coarse weaving. Such a loom costs Rs. 40 or 50.

As I have stated previously, in starting hand-loom weaving on a factory system, in order to successfully compete with power mills, some preparatory machines such as winding, warping,

sizing, beaming and drawing are needed, which may cost very little and give more production, and I propose to describe them in order.

WINDING.

Mr. Patel has constructed such a winding machine for the use of the Nadiad Silk, Woollen, and Cotton Hand-loom Weaving Co., Ltd. By this machine a hundred bobbins, each of two hundred yards in length, could be wound round by three boys in ten hours. One boy learns the fly-wheel, and two boys stand on the two sides of the machine to mend the threads. The work thus executed would require for its performance on the Charka, four days. Thus a great saving has been effected by the construction of the winding machine, which is valued at Rs. 125.

WARPING AND SIZING, ETC.

Many types of warping machines have been manufactured during the last three years, and of these only three kinds are considered the best. They are the Drum warping, the Churchill warping and Kelkar's warping machines. The last named machine is not so good as that of Mr. Churchill's, which is the best warping machine but that it is heavy and costly. In the Nadiad factory, Mr. Patel first prepared a drum winding and warping machine after the type of a power-mill but that machine proved to be useless for two reasons—(1) heaviness, (2) the wood of the drum contracted and expanded owing to changes in the weather. So Mr. Patel felt the necessity of constructing a machine that would work with ease and would warp and size at the same time. The machine is now perfect and gives most satisfactory results.

This machine is fitted with a sizing box which has a hearth below to keep the mixture in the box hot. It is also provided with two fans to dry up the size before the yarn is wound round the disk bobbins. These fans are worked by a boy ten years old. Near the size box another boy watches the threads coming from the creel, and mends them when broken, and also stirs the mixture in the box, thus preventing it from becoming thicker. A third boy sits at the other extremity of the machine, and turns the handle of a pulley upon which the disc bobbins are wound up. In this way in

a day of ten working hours three boys are able to wind light disc bobbins of 200 yards in length by 27 inches in breadth. If, instead of single yarn cotton, twisted or silk yarn were to be used, the result would be more than double within the same time and the same number of boys working. This machine is called a sectional sizing and warping machine and it costs nearly Rs. 250 exclusive of disc bobbins which cost Rs. 4 each. The machine is also fitted with an automatic register to indicate the number of yards warped.

BEAMING AND DRAWING MACHINES.

They are very simple in contrivance. The first has some wheels and rollers, by means of which, yarn is wound round the beam from the disc bobbins, and when the beam is ready, it is carried to the drawing machine, where all the threads of the yarn on the beam are passed through the healds and reeds, and the beam with the yarn is placed on the loom to be woven. These two machines cost nearly Rs. 100. To work these two machines four boys are required.

ERECTION OF BUILDING FOR A WEAVING FACTORY.

In weaving by hand-power and in erecting the factory building, much care should be taken. The improved hand-loom stands from three to four feet high from the level of the floor. The climate of this country being hot, the threads of the warp often brittle and the ordinary class of Indian weavers being against such waste of time and energy in mending the threads, fall back upon their old trusted machines, the pit-looms. These looms, being placed to the level of the ground, and owing to the lightness of their working, give comparatively less breakages. Therefore, in erecting factory buildings, where improved looms are to be used, much care should be taken and I have found it so from personal experience.

The Nadiad Factory for want of a building of its own is located in a *dharmasala* or a caravansary. The building has a roof on all sides with an open ground in the middle. The surrounding walls are 8 feet high, while on the opposite sides the roof is suspended upon pillars ten feet high. Consequently the height of the middle portion of the roof is fourteen feet. The building being open in the middle, rays of the sun fell upon the machines, and the warp, being exposed to extreme

heat, cold and rains, had many breakages, and even the best weaver was not able to produce 2 yards of cloth of 60's. The open sides were then covered up with hemp curtains, but this was of no avail. The floor also was sprinkled with water, but it soon got dried up. The roof being low and single-tiled, got so very hot that the weavers perspired very profusely and refused to work in the noon time. A happy idea originated and the floor was caused to be covered up with the sand of river-banks, and the sand was saturated well with plenty of water. The river sand having the power to retain moisture, the desired effect was produced in the hottest part of the year and with the heaviest machine of the company. So moist air plays an important part in the art of weaving, and that has been one of the difficulties which have beset the progress of the improved hand-loom in India, and the fly-shuttle loom weavers have not been successful in competition with the common country loom weavers.

No doubt there are certain places in India the air whereof is damp enough to impart the necessary toughness to the size upon the warps, and in such places, the fly-shuttle works better than the old country loom. But in many places, the atmosphere, being too dry, and the size being dried to brittleness was rubbed off the warps by the movements of the reeds and healds. It is thus plain enough that the extra stress thrown upon the healds by the rapid working of the fly-shuttle, which is nearly double, demands a uniformly moist atmosphere for successful working. In the case of the weaving sheds worked by steam-power humidifiers have been introduced which have considerably increased the rate of production. If the rate of work is increased the yarn is subjected to greater frictional stress and the moisture in the air must, therefore, be increased. The main object in moistening the atmosphere wherever its temperature and dryness are excessive is to impart a certain amount of humidity to the size of the yarn of the warp, whereby the size, which is brittle when dry, becomes tough and adhesive.

In the case of finished yarn, if it is not sized and cemented together with a mixture, it draws apart, and, therefore, a great amount of moisture is required to keep the size in the best condition. If the air is hotter the more water it

will carry at the point of saturation, and, therefore, temperature as well as humidity should both be necessarily considered. It is a well-known fact that when the outer air is too dry the air in the factory can only be moistened when the building is closed. This is a means of circulating a constant supply of fresh air, and this constant renewal will naturally demand a much greater amount of moistening than if the same atmosphere was kept in the factory.

In my opinion the building for a hand-loom factory should be constructed as under. The roof should be 20 feet high and the building should have as few glass doors as possible. The floor should be covered up with river or seasands four inches deep, and saturated well with clean water in the morning.

Small holes should be made in the wall near the level of the floor for ventilation, and in the roof at a distance of every twelve feet chimnies of one and a half feet in diameter and six feet high above the roof should be built. This will impart sufficient light for the work to be done underneath. Also, before the workman has commenced his work, the warp in front of him should be covered up with a thick wet cloth, which, when it is dried up, should again be wetted.

The piece of cloth should be of such a width that it may be stretched round the three sides of the loom, and this process would help to retain the moistened atmosphere. The wet sand below should also be turned upside down by means of a spade at least once in a week, and the ground again moistened with fresh water. In the hot weather the moistening process would have to be continued every third day, instead of every week. Especially the sand lying directly underneath the warp should be kept well drenched with water. In every case the moisture must be applied from below, as moistened air, being lighter than dry air, has a tendency to rise. If, instead of constructing many chimnies above the roof, only one big chimney were made that also would serve the purpose. But if the factory is very large, to drive away bad air, a fan worked by a boy should be placed in a corner of the building. Watering of sands and the working of a fan are not needed during the rainy season.

CAUSES OF THE DECAY OF HAND-LOOM WEAVING
IN INDIA.

The disappearance of the spinning wheels which, only half a century ago could be seen in every house in India, was a necessary corollary to the decay of the hand-loom industry. The poor people were among the first to use the cheap fabrics of the foreign country, and with this change, their women gave up spinning of cotton for being woven into cloth by a weaver. Sudden influx of foreign goods in India resulted in depriving millions of their employment. The hand-loom has now been revived in an improved form, and the *Charkha* ought to be reinstated in the same manner if possible. It would prevent starvation among the millions of India to a greater extent than cotton mills. With the improvement in the hand-looms, improvement in *Charkha* also must not be neglected. Some of you must have seen women of the lower class turning their spinning-wheels sitting near the doors and earning nearly an anna or so. With the extinction of *Charkha* from this country, many widows of respectable families have been starving and if the *Charkha* is not reinstated in due time that industry will be annihilated in the course of two years. At the commencement of the British rule in India, cloths of fine texture were being imported into England when the mill industry of that country had even not taken birth. The well-known Dacca Muslin was made from yarn that was spun through a very fine hole being made in the nail of a finger. Whether it was spun in that way or by means of spinning wheels it is a fact that our women are not able to turn out such fine yarn now, and evenness in thread cannot be obtained. The *Charkha* is moreover capable of improvement from time to time, but unfortunately none of these has come into general use. The Indians have been famous for their inventive power which has remained dormant for centuries. If any inventor were to tax his brain in improving a suitable *Charkha* so as to spin an even thread and of desired fineness he would be conferring upon the poor women of this country a very great boon. The erection of mills cannot specially benefit the people in the interior and it would be a happy sign if a proper *Charkha* is invented, which would stop the importation of foreign machinery. It may be possible to organize weaving com-

panies on the factory system but as long as we have to rely on Manchester for fine yarns, so long will the weaving industry stand on a sandy basis. Manchester by raising the price of yarn may destroy it in no time. Also, it is not possible to start many spinning and weaving mills in this country. We have not sufficient capital and enterprise to do so. Again, the Indian mills have a gloomy future because the Government are going to curtail working hours in the factories, which will result in killing or crippling our cotton mill industry. Moreover, the Indian *Charkha* is not a very costly thing. The old pattern *Charkha* costs only a rupee or two. Those who take interest in the problem of the weaving industry in India have in my opinion done enough in the matter of improvement of hand-looms, which will continue to receive due attention. And it is, therefore, essential for the preservation of the Indian hand-loom weaving industry that some tangible improvement should be made in the *Charkha* so as to compete with the mill spinning. The only means of introducing improvements in the old *Charkha* is by means of starting competitions in hand spinning and giving prizes to successful candidates and awarding medals to inventors of an improved *Charkha*. This could in my opinion be taken up by the Congress Exhibition Committee or by the Industrial Conference.

GENERAL REMARKS.

The salvation of India rests upon improving her agricultural and industrial problems. This paper has nothing to do with matters agricultural. But next to agriculture the hand-loom weaving industry stands foremost. This industry requires to be developed. The Indian weavers as a class are against adopting improved machines for reasons known to them. For spreading the knowledge of improved methods and appliances all over the country hand-loom factories may undoubtedly be regarded as very useful agencies. But to start such factories capital is required and it is sometimes very difficult to subscribe such a small capital in the mofussil. The capitalists of large cities go in for mills and from personal experience I say that they possess the idea that the hand-loom industry cannot be a success and money invested in it would be thrown away. People in the interior have no spare capital and those who have little rather like to lend the same on interest than invest

it in such concerns. This is a great drawback. Again, we Indians are a very calculating people and the articles manufactured by the hand-loom being slightly costlier than mill-made fabrics, they do not like to buy them. The foreign articles of perfect finish and cheapness tempt them to buy, but the fact that the Swadeshi articles are of more durability should not be forgotten. Also, your country's interest and welfare claim a little sacrifice from you.

THE COAL MINING INDUSTRY OF INDIA.

By H. H. MACLEOD, Esq.,

Chairman, The Bengal Coal Co., Ltd., Calcutta.

The earliest records of coal mining in India come from Bengal, and it is the vast deposits of this valuable mineral in Bengal which to-day is responsible for $\frac{3}{4}$ ths of the entire output of the country. Valuable deposits are also worked at Singareni in the Madras Presidency and also at Margharita in Assam, but in the former case the quality does not approach the best qualities of Bengal, and in the latter case the coal although of a high quality is so crushed by geological changes in the strata as to lose much of its value. The latter mines are also distant from the great commercial centres and from the sea-board. It is, therefore, mainly the development of the coal fields of Bengal that is responsible for the great progress made in industrial and railway enterprise in India. The history of the Bengal collieries as revealed in the records which have come down to us reads like a romance. The Raneegunge coal field was the scene of the earliest operations and in the neighbourhood of Raneegunge itself the seams of coal are in such profusion, of such thickness and so readily accessible by reason of their slight inclination and proximity to the surface that their working in the early days of the last century proved a comparatively simple task for the untrained worker. It is impossible to avoid the conclusion that these rich deposits have been so placed in order to suit the primitive conditions of the country and the native worker.

The records of the oldest company now working extend back to 1827, and it was about this date that capital was brought in to work the seams of coal on a systematic plan.

All Bengal Collieries are worked on what is known as the pillar and stall system by which coal is left in pillars to support the roof, these pillars being eventually taken out and the surface allowed to fall in. The development of coal mining in India has been greatly encouraged by the interest taken in it and the practical assistance given by the Geological Survey Department of India. India has been fortunate in securing a long line of eminent geologists who have worked quietly but with far-reaching effects towards the development of the mineral resources of the country. In the old half-yearly reports of The Bengal Coal Company an interesting report is recorded over the signature of Thomas Oldham (Geological Survey of India). Mr. Oldham strongly urged the introduction of the panel system as used in the North of England. (See Appendix to this paper.) It is a pity that this system is not more in vogue at the present time, as in many of the existing mines large areas are standing on pillars, and in many cases the area is much too large to be consistent with safety.

Where the coal is outcropping, inclines are run into the beds or seams of coal following the dip or inclination of the seams. As the depth of the coal from the surface increases, vertical shafts are sunk, and the depth of these shafts varies from 80 to 600 feet. Most of the modern mines are equipped with machinery and plant of an up-to-date type and in at least one colliery electrical underground haulage and pumping has been installed with excellent results. Electricity is so flexible a power that it is destined to play a great part in the future of Indian mining, and it is with the aid of Electricity that the labour problem is about to be seriously attacked. It is strange that in a country teeming with population the main difficulty in the way of increasing the output of coal (and thus incidentally retarding industrial and railway development) is the human factor, but in spite of India's millions, the supply of labour is woefully short of requirements. It may be that underground employment is not altogether to the taste of every individual, but I fear the real explanation is not distaste for any particular employment but an inherent distaste for work of any sort. This feature is not confined to the east but where the unit of labour in

the east is only $\frac{1}{5}$ th of the value of his confrere in the west it will be seen that the problem so far as India is concerned is by no means easy of solution. The average outturn of coal per man per day in the United Kingdom is $2\frac{1}{2}$ tons. In India it works out at $\frac{1}{2}$ a ton, and in America with the aid of mechanical coal-cutting plant the average is fully 5 tons. It is natural, therefore, that great hopes are placed on the introduction of suitable mechanical coal-cutting plant into India.

With improved conditions for the labouring classes of India and the gradual raising of their standard of living, it may be possible to inculcate a desire for greater luxury which would bring with it a desire to earn and save more money.

The coal fields are divided geologically into two series known as "The Raneegunge" and "The Barakur." The Raneegunge is the younger and the Barakur the older and deeper series. The ironstone shales divide the two coal measures and the Metamorphic rocks underlie them, so that the limits of each particular coal field are clearly defined.

As regards the quality of Indian coal a comparison with Welsh coal will give some idea of the calorific value of the former.

The Admiralty Standard of Welsh coal is approximately as follows :—

Fixed carbon	...	...	75
Volatile carbon	...	...	22
Ash and moisture	...	...	3
Total...			100

Fair average analysis of good Bengal coal is as follows :—

<i>Raneegunge Series.</i>		<i>Barakur Series.</i>	
Fixed carbon	... 54		60
Volatile carbon	... 34		26
Ash	... 10		12
Moisture	... 2		2
Total... 100		Total... 100	

The striking feature between the Raneegunge and Barakur qualities is the high volatiles and comparatively low fixed carbon in the former as against the high fixed carbon and

comparatively low volatiles in the latter. The competition for popularity among consumers between the two grades of coal is very keen, the high volatile coal being very suitable where rapid steam raising is essential. The above are merely proximate analyses of the coal. It is in the ultimate analysis that a close comparison of the respective values can alone be made. Methane or Marsh Gas (C. H. 4) is the most valuable constituent to be desired in coal for the volatile matter, and so long as the volatile matter consists of "Methane," the more volatile matter in the coal the better it should be. Oxygen is deleterious as it combines with the hydrogen and forms water. Ash by analysis is generally doubled when actual practical consumption is in question.

The present annual output of coal for the whole of India is only 9 million tons, of which Bengal contributes $8\frac{1}{2}$ million tons and the industry employs a labour force of over 100,000 persons. The annual export of coal from Calcutta averages about $2\frac{1}{2}$ million tons and quite 50 per cent. of this is shipped to Indian ports for consumption in the country itself. With the increasing expansion of the railways and industrial enterprise the consumption of coal has reached a point which the coal industry is finding it difficult to keep pace with, and there is no doubt that this—the finest of all Swadeshi industries—has a magnificent future before it. With the advent of the steel works the potentialities are so great that it would be difficult to forecast future developments with any degree of accuracy. Ship-building would naturally follow the manufacture of steel plates and India might become the workshop of the east.

The dormant energy of "Coal" awaits the commands of India's millions and signs are not wanting that a great industrial awakening is in store for India. If the active energy of this useful commodity is fully reflected in the energy of her people, India will take her proper place among the nations of the earth. The Orient has slumbered long centuries—

"She heard the thundering legions pass,

"Then plunged in thought again."

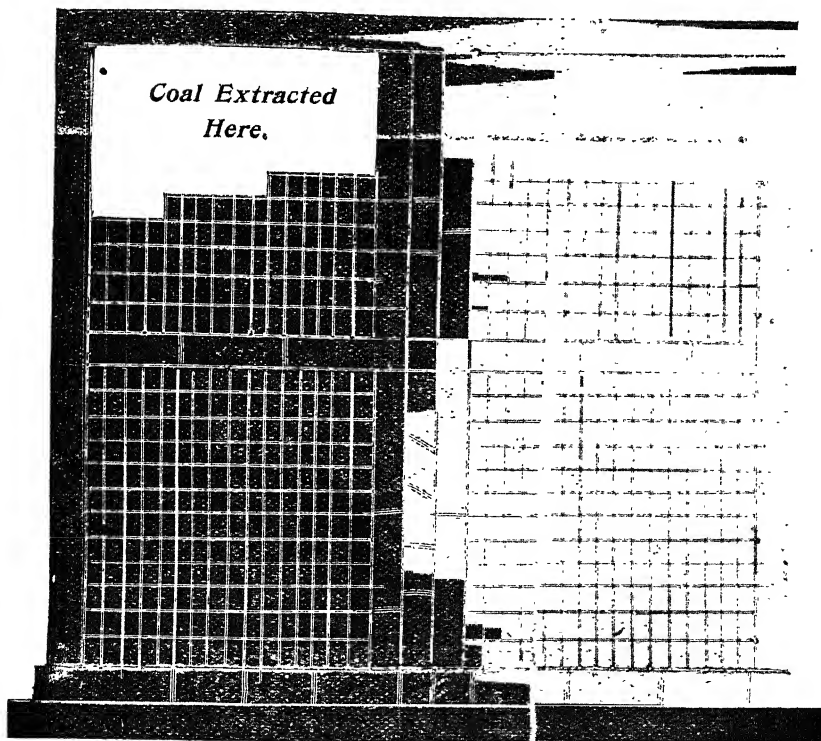
But "thought" which has been merely productive of further thought is not sufficient. It is in the practical application of thought—its conversion into practical energy—on

which the future of the country depends. Will her people rise to the occasion and draw upon the vast fund of potential wealth and energy which nature has so lavishly provided her with? She *can* do so and it is the ardent hope of all well-wishers of India that she *will* do so.

APPENDIX.

I would recommend the adoption of a modification of the panel system as used in the North of England. You are, of course aware of the peculiarities of this system, but to remind you of it, I give a little sketch here, showing a piece of Coal divided as to four panels, and partly worked :—

CROP.



DIP.

N.B.—This rough sketch does not pretend to be to scale, I have also shown double main roads, these are needful where ventilation is bad, but would not be required at Raneegunge.

COTTON-SEED OIL INDUSTRY.

By RALPH CAHOON WHITENACK, ESQ.,

(MEMBER AM. ACAD. SOC. POL. SCIENCE),

*Economic Adviser and Acting Joint Revenue Commissioner,
Baroda.*

Mr. President and Gentlemen,—I am glad to have the opportunity of speaking to this representative Indian audience, not that I have anything of special value to say on the subject which has been assigned to me and which might be better expounded by others, but because it gives me a chance to extend to you, in a thoroughly informal and unofficial way, an expression of that sympathy which the American feels for a people nobly struggling against adverse conditions. I am sure if it were permitted me to speak for the rank and file of my countrymen the message conveyed across the seas would be one of cordial friendliness and good cheer to every man, whether Indian or Briton, who puts his hand in a sincere and practical way to the problem of ameliorating the economic condition of the Indian people. America notwithstanding its present high position among the commercial nations of the world, has not reached pre-eminence without hardship and struggle. Whether we approach the history of her development from the standpoint of economics, sociology or politics, we shall find the annals replete with the story of toil and sacrifice. I am not unaware of the impression which sometimes one hears, that the American has somehow manipulated a "corner" on the dispensations of Providence and is merely a "lucky" fellow with no special virtues of his own. The following is a fair sample of the stories which occur from time to time in the European Press:—

"Our Washington correspondent cables that Hart Momen, Chief of the Agricultural Division of the Census Office, is in the West assisting in taking the Census. He reports unofficially:—'James Miller has a cornfield, where he raises choice popcorn. So intense has been the heat of the sun that the kernels have exploded on the cob into flappy white flashes. When the sun creeps up, 'pop, pop, pop,' is heard all through the corn patch, Miller is now eating popcorn of the cob.

Besides popping corn the sun is hatching chickens out of crates of fresh eggs.' ”

Of course I should not want to contradict stories of this kind concerning the bounties of nature in America, having had no personal experience in the matter. Whether the incident narrated be true or not, however, it is undeniably true that the typical American knows what it is to undertake an up-hill fight, and that he cordially sympathizes with every effort of the Indian people to achieve economic independence.

It gives me pleasure to address you, again, because I have the honour to represent, in a modest way, the efforts being put forth by that most distinguished citizen of India, His Highness the Gaekwar of Baroda, to foster the commerce and industries of the country. His Highness has recently sanctioned a scheme of State subsidy whereby the “ Bank of Baroda, Ltd., ” shortly to come into existence, will be able to extend its facilities to a large part of Guzerat and Kathiawar. Other projects are receiving the attention of the Baroda Government not the least of which is the cotton-seed oil industry. It was a year ago that the writer sent out from America a brief note on the cotton-seed industry which led to the immediate registration of two companies in Baroda State. We are glad to learn also that a third company has recently been organized in the neighbouring city of Broach. Yet I would call attention, at the outset of this paper, to the fact that the commercial feasibility of the industry in India has not been demonstrated beyond the possibility of mishap and while my attitude towards the infant industry is thoroughly optimistic, I would have it understood that I consider the industry in the experimental stage, so far as India is concerned. With patient experiment and cautious management I have no doubt that in time the industry can be put on sound financial ground.

BRIEF HISTORY OF THE INDUSTRY.

Cotton fibre has been used from the remotest days as a textile material, yet it is a surprising fact that we have no record of the utilization of cotton-seed or cotton-seed oil until very recent times. For several generations the Chinese and the cotton growers of India have ground the whole seed in

crude mills and fed the cake to their work oxen, using the crude oil extracted by this operation for purposes of illumination. Among Western nations the first mention of cotton-seed oil is to be found in the Proceedings of the Society of Arts, Manufactures and Commerce for the year 1783 where it is stated that seed from the West Indies had been crushed in a mill in London and the oil extracted. It was not till 1826 that a mill was set up for the extraction of the oil, in Columbia, South Carolina, U.S.A. The development was extremely slow, however, and in 1860 there were only seven establishments for the manufacture of cotton-seed oil in the United States. It was not till the close of the Civil War in 1866 that the industry began to make rapid progress. In 1870 there were 26 mills; in 1880 there were 45 mills; in 1890 there were 119. Up to this time the oil was almost entirely exported to Europe, owing to the preference in America for animal fats for edible purposes. It was not until the oil, in the form of Oleomargarine and lard compound entered the market as a substitute for lard and butter that the industry began to assume its present vast proportions. To give some idea of the scale on which the cotton-seed oil industry is at present conducted, I quote the latest Statistics of the U.S. Department of Commerce. The number of establishments in the U.S. alone is now 715, employing a capital of over 22 crores of rupees. The value of the annual output is 29 crores of rupees, and the average number of wage-earners employed annually is 16,000.

Similar figures for the United Kingdom I do not have at hand, but the general progress of the industry has been no less remarkable in England than in America.

COMMERCIAL FEATURES.

The uses to which the cotton-seed and its products have been put are probably known to many of my hearers, but for the sake of completeness, and for the benefit of those who are not familiar with the story, I shall note the salient facts. In former times cotton-seed was considered only useful to plant, but thousands of tons were annually burned or dumped into the rivers. But at last it was shown that cotton-seed was not only valuable as a fertilizer and feeding stuff in its crude

state but was capable of furnishing products that are among the most important elements of modern industry.

Oil.—The oil is the main product, and is used in America and Europe for a great variety of purposes. It is safe to say that nine-tenths of the oil annually produced in the United States, for example, enters into the composition of food products, principally butter and lard substitutes and salad and cooking oils. In pharmaceutical preparations it takes the place of olive oil; in fact immense quantities are used on the continent of Europe in the preparation of olive oil.

At first cotton-seed oil was used as an adulterant to soften and temper lard; later on the fluidity of the oil itself was corrected by mixing it with beef-fat, and this mixture was put on the market under the name of compound or refined lard. It was so kindly received by the public that before long all disguise was dropped and it was sold on its merits in competition with butter and lard. The refined oil is also used to a considerable extent as a lubricant, and the residue of the refining process is valuable as soap-stock, used in the manufacture of laundry, family and fancy soaps.

Meal.—Cotton-seed meal is the ground residue or cake left after the extraction of the oil by pressure. Its composition depends upon the composition of the seed and on the process used in preparing the seed, that it is to say, whether lint and hulls are removed before crushing, and also upon the success with which the oil is extracted. Cotton-seed meal is rich in fat and protein (nitrogenous matter) though poor in carbohydrates (starch, sugar, etc.), and when mixed with a coarse fodder containing abundant carbohydrates furnishes a valuable ration for cattle. In comparative valuations of feeding stuffs it has been found that cotton seed meal exceeds corn meal (or maize) by 62 per cent., wheat by 67 per cent. and raw cotton-seed by 26 per cent. The meal is also extensively used as a fertilizer. It contains phosphoric acid and potash in small amounts (2.88 per cent. and 1.77 per cent. respectively) but is chiefly used as a source of nitrogen in fertilizers (containing 6.79 per cent. of this element). Cotton-seed meal has given excellent results in the United States as a fertilizer for sugar-cane, cotton and maize. It has also been successfully substituted for barn yard manure in the culture of tobacco,

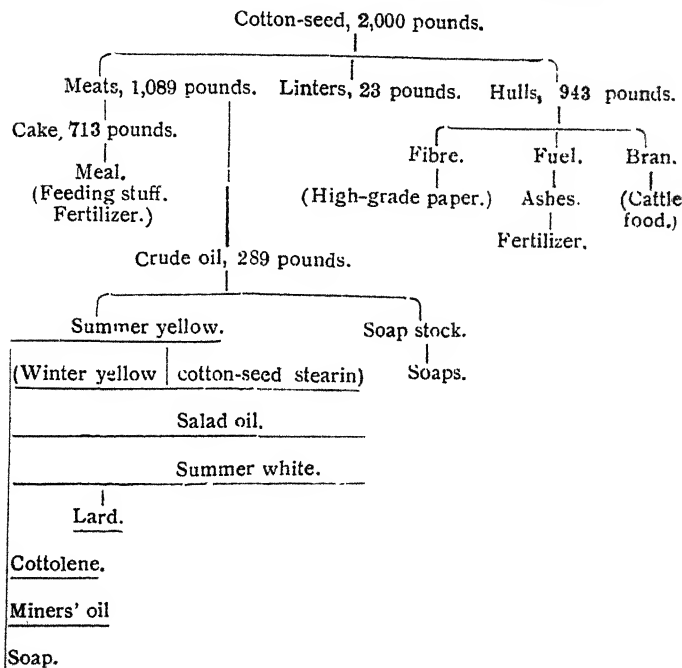
The general practice, however, in recent years, has been to utilize the meal principally as cattle food and apply the resulting manure to the soil. From 80 to 90 of the fertilizing materials of the meal is thus recovered in the manure, and from the food-stuffs additional benefit is secured in the production of meat, milk, etc.

Hulls.—Cotton-seed hulls constitute about half the weight of the ginned seed. Analysis shows them to be principally crude fibre and nitrogen-free extract matter, these two constituents, with water, constituting more than 90 per cent. of the hulls. The average composition is water 11·36 per cent. and 2·73 per cent., protein 4·18 per cent., fibre 45·32 per cent., nitrogen-free extract 34·19 per cent., fat 2·22 per cent. On superficial examination the hulls, which are hard and dry and covered with a fuzzy lint, appear to be a most unpromising food material, and, in fact, until a comparatively recent period they were universally considered worthless for this purpose. The first attempts at systematically feeding an exclusive ration of hulls and meal on a large scale were not made until 1883. Since then the availability of hulls as animal food has been amply proved. They form a handy medium to dilute condensed food, and give that extension to the animal stomach, especially to ruminating animals, which is regarded so essential to healthy digestion. They have been found to be a cheap and effective substitute for hay. Experiments in the U.S. Department of Agriculture have proved that 10 per cent. of the protein of the hulls is digestible, 38 per cent. of the fibre, 40 per cent. of the nitrogen-free extract, and 77 per cent. of the fat. So that 100 pounds of hulls contains 33 per cent. of digestible food constituents.

The fibrous elements of the hulls are also used in paper-making in the United States, for fuel, and for fertilizer. Cotton-hull ashes have been on the market for a quarter of a century and have come into great demand as a cheap potash supply, especially among tobacco growers. Analysis of the ashes shows water 9 per cent., phosphoric acid 9·08 per cent., potash 23·40 per cent., lime 8·85 per cent., magnesia 9·97 per cent., carbonic acid 10·57 per cent. The value of the ashes for fertilizing purposes depends on the amounts of potash and phosphoric acid they contain.

The following diagram, prepared by Grimshaw on the basis of the actual results at oil mills, shows how a ton of cotton-seed is utilized in America.

PRODUCTS FROM A TON OF AMERICAN COTTON-SEED.



FEEDING COTTON-SEED PRODUCTS TO FARM STOCK.

Before passing, something more should be said of the feeding value of cotton-seed products. Practical experience has been supplemented by carefully conducted experiments, both in the United States and Europe, with cotton-seed, cotton-seed hulls, and cotton-seed meals as food for cattle, sheep, pigs, horses, and mules, with the result of demonstrating their high feeding value for all kinds of farm stock, with the possible exception of calves and pigs, to which they have frequently proved fatal.

The high feeding value of whole cotton-seed has long been recognized, having been fed raw, roasted, steamed, or

boiled to live stock, especially to cattle. Almost from the beginning of cotton culture in this country it has been used to some extent as a feeding stuff, but since the introduction of the cotton-oil industry the superior feeding quality of the by-product—cotton-seed meal—has led to a very general displacement of whole seed by the meal in localities where the latter is easily and cheaply obtained.

The value of cotton-seed meal for producing meat, milk, and butter is well established. It is one of the cheapest of the highly nitrogenous feeding stuffs and is, therefore, one of the most economical for balancing rations deficient in protein, such as those in which corn is the principal grain. As the analyses show, it is very concentrated and should be fed in comparatively small quantities in connection with a large proportion of coarse food, such as silage, corn, straw, corn stover, cotton-seed hulls, etc., or with good pasturage.

Although milch cows will do well for an indefinite period on cotton-seed or cotton-seed meal as the sole grain food, it is better to add a second, such as corn meal or wheat bran, to the ration. If fed to cows in large amounts without proper admixture of other feeding stuffs it is likely to injure the quality of the butter as regards flavour and colour. It appears, however, to harden the butter and thus to enable it to stand shipment better. It has also been found to facilitate very materially the rise of cream by gravity.

Referring to the analyses of cotton-seed hulls and meal in the previous pages, we find that neither of them is adapted for use alone as food. The hulls contain a large excess of non-nitrogenous matter and the meal a large excess of protein; each lacks what the other has in abundance. The meal is well adapted by its composition to be fed with the hulls, and the hulls find their proper supplement in the meal. This relation is so evident that the fact that it was not pointed out much sooner is peculiar, although the uninviting character of the hulls as food doubtless had the effect of diverting both scientific and practical investigations from them.

The usual ration for fattening cattle is 3 or 4 pounds of meal at first, which is gradually increased to 6, 8 and even 10 pounds per head per day, and all the hulls they will eat.

The proportions vary from 2 to 6 pounds of hulls to 1 of meal, the most common ration at present probably being 4 of hulls to 1 of meal. The feeding is continued from 90 to 120 days. All the information at hand indicates that this practice is both economical and profitable. The diet, apparently, does not injure the health of the animals nor impair the healthfulness of the resulting products, beef, mutton, milk and butter.

PROCESS OF MANUFACTURING COTTON-SEED PRODUCTS.

The process through which the seeds are put at the mill is, briefly, as follows:— (For a full and technical account of processes I would refer those interested to the professional treatises on the subject. The best treatises that have come to my attention are—Lamborn : "Cotton-seed Products," and Tompkins : "Cotton and Cotton-oil.")

The first process in preparing the dry seed is to free it from dust. This is effected by shaking it in a screen or in drums lined with a fine metallic net and containing a strong magnet to which any iron nails will adhere, which are frequently present. From the drums the seeds drop into a gutter leading to a machine which removes the lint left by the gin. This is done by a gin constructed for the purpose, with saws closer together than the ordinary cotton gin. An average of 22 pounds of short lint is taken from a ton of the seed. This product, called "linters," is used in the manufacture of cotton batting. The cleaned seeds are then transferred to the sheller, which consists of a revolving cylinder containing 24 cylindrical knives and 4 back knives. The sheller revolves at great speed, and as the seed is forced between the knives the pericarp or hull is broken and forced from the kernel. The mixed shells and kernels are separated in a winnowing machine by a strong blast of air. This removal of the husk makes a vast difference in the meal cake, a desiccated or decorticated cake being five times more nutritious and wholesome than an undecorticated cake.

Being thus cleaned, shelled, and separated, the kernels are carried by a system of elevators to the upper story, and then passed down into the crusher rolls to be ground to flour.

After this crushing the meats drop into a conveyor, which delivers them to the heaters. These are large cast-iron steam-

jacketed kettles provided with stirrers which keep the meats moving while they are being cooked. The duration of the cooking varies from twenty to thirty minutes, according to the condition of the kernels and the good judgment of the cook, a human quality here called for the first time to supplement the automatic mechanism that has conducted the seed to this point through all the various processes it has undergone in its journey from the seed house. The object of the cooking is to expand the oil in the meats and render it more fluid, and to drive off the water, which not only reduces the quality of the oil but is liable to work serious injury to the expensive cloths used to envelope the cakes in the press. Very dry meats may sometimes be cooked in twelve to eighteen minutes, while fresh seeds may require forty-five minutes. Close to the heaters stands the "former," which shapes the meats into cakes for the press. The cakes as they come from the former are wrapped in hair-cloth and removed by hand to the press, where they are arranged in a series of boxes, one above the other, between the plates of the press, and subjected to a pressure of 3,000 to 4,000 pounds to the square inch by hydraulic power. The cakes, pressed as solid as boards, are taken from the press, stripped of the cloths, and stacked to dry. When dry they are passed through a cake cracker, which breaks them into fragments of a size suitable to be fed to a mill. The mill grinds these fragments into a fine meal, which is put up into sacks. Sometimes the meal is bolted to separate it from small pieces of the hull, which, being tough and leathery, are not readily ground up.

The English process differs from the above chiefly in that the lint and hulls are not removed, but the seed is merely cut open and then crushed.

The decorticated and crushed cotton-seed yields by expression an odourless, dark, brownish-green oil, having a specific gravity varying from 0.92 to 0.93. After being treated with alkaline solutions a clear, yellow oil, which is odourless and of pleasant taste, is racked off. The residue is called soap stock. The refined oil boils at about 600° F. and congeals at about 50° for summer and 32° for winter pressed oil.

In the process of refining, the impurities in suspension are usually allowed to settle, and the clear supernatant oil is drawn off. To the latter from 10 to 15 per cent. of caustic soda (10°-28° Baume), according to the nature of the oil, is added, and the mixture agitated at a temperature of 100°-110° F. for forty-five minutes, the precipitate being allowed to settle from six to thirty-six hours. The residues obtained are disposed of as soap stock, in the manufacture of stearin, etc.

The yellow oil resulting from this process is further purified by being heated and allowed to settle again, or by filtration, and is called summer yellow oil. Winter yellow oil is made from the above material by chilling it until it partially crystallizes and separating the stearin formed, about 25 per cent., in presses similar to those used for lard. The latter constitutes the true cotton-seed stearin of commerce and is largely used in the preparation of butter and lard surrogates and candles.

Another substance, improperly called cotton-seed stearin, is obtained by distilling with superheated steam the mixture of organic acids formed when the mineral acid is made to decompose the 'foots' obtained during the process of refining cotton-seed oil by alkalies, and pressing out the 'olein' from the distillate after cooling and solidification.

For the preparation of the white oil of commerce the yellow oil obtained as above is shaken up with 2 to 3 per cent. of fullers' earth and filtered.

THE PROSPECTS IN INDIA.

So much has been said of the general character and methods of the industry in other countries. What of the possibilities in India, the second cotton country of the world?

One needs but glance over the export figures of cotton-seed for the last ten years to realize that an immense amount of raw material is leaving the country without adequate return, and that an industry possessing potentialities of large development has been too long neglected in this country. At the present time not a single cotton-seed oil mill operates in India. Yet during the last ten years the annual export of seed has jumped from 1,418 tons, valued at Rs. 76,307, to

219,376 tons valued at over a crore and a quarter of rupees. In America with seed at an average price of 15 dollars (45 Rs.) per ton (2,000 pounds), the milling value assigned to the products of a ton of crushed seed is 27 dollars (Rs. 81), showing that the value added to a ton of seed by the mill process is 55 per cent. Multiplying the value of the seed exported annually by 55 per cent. we discover that an industry worth two crores and over is being sacrificed, and this amount represents the value of the crude products only. When the value of the finished products is considered we begin to get some idea of the possibilities of development latent in this industry. Further more, it has been estimated that the total amount of ginned cotton-seed in the country during 1906-07 was 1,840,492 tons, that is to say approximately eight times the amount annually exported. An industry with a potential yearly value of 16 crores as yet untouched !

And now the queries of a practical nature arise quick and insistent,—

1. How does the Indian seed compare in commercial value with other seeds ?
2. Where are the markets for the manufactured products ?
3. In what form will the market absorb products and bye-products ?
4. What are the most likely processes ?
5. What are the probable returns ?

THE QUALITY OF INDIAN SEED.

That Indian seed is of inferior quality in some respects, as compared with Egyptian or American seed, either sea-isle or upland, is too well known to need comment. The seed is smaller and fuzzier and, therefore, more difficult to manipulate. The percentage of oil is lighter and that of hull heavier. In order to get an accurate idea of the comparative values of Indian and American upland (which proves more satisfactory in experience than Sea-isle) I forwarded a large quantity of seed to the Tompkins Company last spring and have received the following analysis of the average results through the Department of Commerce at Washington.

	American.	Indian.
Weight of seed (grams)	11.9	4.5
Per cent. of meats	55.0	45.0
Per cent. of hulls	45.0	55.0
Per cent. of oil and meats	21.4	18.0

I quote from the report :—

“ It is not possible to forecast by this analysis what the exact difference would be in actual milling.....but a fair estimate would be as follows, assuming the present average yields and values of products and omitting linters (which was not determined in the analysis) :—

—	American.	—	Indian.
44 gallons oil at 35 cents per gallon	\$ 15.40	35 gallons oil at 35 cents per gallon	\$ 12.25
800 pounds meal at \$1.25 per 100 pounds	10.00	640 pounds meal at \$1.25 per 100 pounds	8.00
650 pounds hulls at 30 cents per 100 pounds	1.95	900 pounds hulls at 30 cents per 100 pounds... ..	2.70
Total	\$ 27.35	Total	\$ 22.95

This table would indicate the milling value of Indian seed \$ 4.40 below the American, *i.e.*, say 17 per cent.”

It must be remembered, however, that the above analysis, however useful it may be as showing the comparative values of American and Indian seed, assumes necessarily American methods of handling and American prices. In order to arrive at the real mill value of a ton of Indian seed we shall have to alter the figures at certain points to fit the conditions. In the first place it will be noted that the process followed in India, at least at the outset, should be the same adopted in England for the handling of Indian seed, that is to say, the crushing of the seed, without delinting or decorticating the hulls. By this process hulls and meats are crushed together into cakes and the proportion of merchantable cake greatly increased, although at some sacrifice of market value. In figuring on the value of the oil I assume that four to six per cent. of oil will

remain in the cake after crushing, as all experiments indicate, and that 12 to 13 per cent. will be extracted by the crushing process, that is to say, 280 pounds (37 gallons) per ton of 2,240 pounds. The average price for the last two years for refined oil of Indian seed in London has been Rs. 324 per ton. I, therefore, deem it safe to estimate the value of crude oil at one rupee per gallon, which is approximately 10 per cent. less than the price quoted on American oil. In estimating the value of the cake, I assume, in accordance with the practice both in England and America, that a ton of cake is equal in exchange value to a ton of raw seed, that is to say, at the average prices for the last two years, Rs. 56 per ton in Bombay, £4 5s in London. We are now in a position to estimate the mill value of a ton of Indian seed in India :

	Rs.
37 gallons of oil at Re. 1 per gallon	37
1,800 pounds undecorticated cake at Rs. 56 per long ton	44
Gross mill value per ton... ..	81
Cost of seed per ton	56
Mill expense per ton (including interest charges)	12
	68
Net profit per ton	13

THE MARKET.

No forecasts of the mill value of the seed are of any use, however, until we are sure of a market for the products. And under this head it should be pointed out that the market for cotton-seed products in India must to a large extent be created, and the chief problem connected with the development of the industry will be the disposal of the cake at a profitable rate. For the disposal of the oil I am convinced a market can be readily created in India and neighbouring countries. With a small admixture of ghi to give consistency the stearin, which forms about 25 per cent. of the oil will readily yield a product which can profitably be sold at a price considerably below that of ghi, and will in time form

a popular substitute for the more expensive article. It is quite probable, moreover, that a ready sale will be found in the bazaars for the simple refined oil (summer yellow) as a competitor of "sweet oil" and other edible oils commonly sold at four to six pounds for the rupee. The problem of how best to approach the Indian market, however, is one that can only be satisfactorily answered by experiments on a commercial scale. It is a well-known fact that the residue of the refining process, or "foots," is the cheapest and one of the best soap-making material in the market to-day and the growing soap-industry will absorb large quantities of oil. I am informed through the American Consular service that importers at Marseilles are also actively looking for soap-oils at this time importing no less than 22,000 tons in 1906. England imports no less than 38,000 tons of oil per annum in addition to the immense quantities pressed at Hull and other centres. The embargo on cotton-seed oil has recently been lifted in Turkey, and a large market is developing there, as well as in China and Japan. With such a vast dormant demand in India, and with the rapidly expanding demand of Europe, there can be no doubt that oil produced in India can be profitably disposed of in practically any quantity.

The great problem, however, as before intimated, is how to market the cake. And in this there can be no doubt that greater difficulties must needs be met. The science of cattle breeding and the industry of dairying have as yet reached so little development as to have created very scanty demand for expensive concentrated foods. I am convinced, however, that there is sufficient demand even now to support the industry on a small scale, and its development will depend to a large extent upon the development of scientific dairying and stock breeding and upon the energy of local oil-presses in cultivating foreign markets for the cake. Active canvassing and judicious advertisement will do much to develop the market at home, as a competitor of linseed, safflower, sesamum and other native seed-cakes. Analyses offered in the Dictionary of Economic Products of India (Vol. IV, G. 424-30) show that cotton-cake is richer in carbo-hydrates than linseed, til, safflower or rape-seed

meal, though somewhat less rich in albuminoids than the other seeds mentioned. We are endeavouring to solve the problem in Baroda, to a limited extent, at least, by the establishment of a dairy farm. For an excellent discussion of the relations between the cotton-seed industry and dairying the auditor is referred to an article in the *Indian Trade Journal* of October 24th last.

It is probable, however, that Indian crushers will have to depend principally upon foreign markets for the disposal of the cake. Nor do I agree with those who maintain that the development of the cotton seed industry will benefit the country only if the country is able to absorb all the bye-products of the manufacture. It is a well-known fact that both England and America export a large proportion, both of the oil and the cake. It is not, therefore, held that the industry is not an economic gain to these countries, nor should it be so maintained as concerning India. Some statistics of foreign markets for cake will not, therefore, be out of place at this juncture.

In England the imports of cotton-seed cakes are stated as follows for the last three years :—

1905	110,336 tons	£ 592,403
1906	94,459 „	547,036
1907	106,285 „	650,870

In Norway the average annual import of cake and meal is stated at 20,000 tons.

In Germany the importation of oil cakes of all kinds was 461,480 tons in 1906.

In France the imports of 1905 were 147,000 ts in 1905on.

Denmark and Belgium likewise use immense quantities of cotton-seed cake, and meal for cattle food.

It will thus be seen that while the home market for cake and meal may be slow in developing, there is no dearth of foreign demand. It remains only for the Indian manufacture to meet the competition in so far as possible with regard to quality.

PROCESSES.

I have already intimated, casually, my conviction that at the outset the most advantageous process to adopt will be the English, that is to say, crushing the seed without delinting or decorticating. At the same time my advice would be to install delinting and decorticating machinery, inasmuch as the competition of American decorticated cakes in the foreign markets may demand the adoption of the American method of delinting and decorticating in India. It is possible also, that the only way to prevent "heating" and consequent deterioration in transit may be the removal of lint before crushing.

CONCLUSION

But I have already drawn this paper out to unwarranted length, and while there are many important questions unanswered, and indeed unanswerable except by the method of patient experiment, I trust, I have set forth some ground for the conviction that the cotton-seed oil industry is likely to prove commercially feasible in India and to assume large proportions in the not distant future. Much has been said and written on the subject during recent months; it is now time for action. The main thing at the outset is to provide scientific apparatus for both crushing and refining the oil, under expert superintendence. And the industry will thrive in proportion as it is associated with ginning and dairying, and with the necessary outfit for utilizing the bye-products in the manufacture of soaps, candles, ghi and other finished products of daily use.

OILS AND OIL-SEEDS.

By P. RAY CHAUDHURI, ESQ., *Barrister-at-Law, Calcutta.*

Some two years ago, when I was engaged in helping a friend in the compilation of "*The Indian Industrial Guide*," the subject of oils and oil-seeds first attracted my attention. In my endeavours, since then, to help my colleagues in the formation of the many unions and trade-guilds in Calcutta, I became acquainted with a committee of some Calcutta oil-mill owners, formed about

Personal.

the same time, without the need of any extraneous help. It was also then that I came to know of the deplorable short-sighted policy of these mill-owners, the faulty economic basis on which some of the mills were managed, and to some extent, the regrettable want of honesty of those concerned in the trade. Thus introduced into the subject, I was drawn in through mere curiosity at the outset, to investigate into the conditions of trade and other matters relating to oil and oil-seeds prevailing in our country, and to compare them with those prevailing abroad. Before I was able, however, to bring my researches to anywhere near completion, I was called away to direct my whole attention to a different matter* altogether, which kept me engrossed practically up to the present moment. It is with no inconsiderable diffidence, therefore, that I appear before you with what might naturally strike you to be somewhat premature surmises. If I have persuaded myself to address you at all on this occasion, it is because I earnestly feel the gravity and urgency of the matter requiring your best and immediate attention, which, I hope, I shall succeed in convincing you, taking my stand even on the sure ground of admitted facts and statistics.

Speaking generally, oils are of two kinds,—fixed and volatile. Regarding volatile, or in other words, essential oils, I beg leave to refer you to that admirable and interesting paper laid before the last Conference, held at Calcutta, by Mr. David Hooper of the Indian Museum,—the only authority on the subject in India. Fixed oils may again be sub-divided into three heads,—mineral, animal and vegetable. On the present occasion I propose merely to deal with the last class of oils, termed the ‘fixed vegetable oils’ and their parent oil-seeds.

At the very threshold of investigation, the student of economy is startled at the mammoth figures that represent the annual export of oil-seeds from the country. Not taking into consideration the essential oil-seeds, not a trifling amount, the following are the figures showing the export during the last five years :—

Connotation
of subject.

Export of oil-seeds.

* Calcutta Congress Exhibition, 1906-7.

	CWT.			VALUE IN RUPEES.
1902-3	22,098,659	...	...	14,79,20,605
1903-4	24,567,188	...	...	14,41,03,687
1904-5	26,703,913	...	...	14,27,69,497
1905-6	17,338,626	...	...	10,40,17,449
1906-7	19,539,873	...	...	12,82,97,037

These figures, I submit, are gigantic enough to stagger anybody and will doubtless furnish much food for serious contemplation. While exporting this large quantity of 'raw and un-manufactured article' from our shores, we have had to import annually a considerable amount of oil for our consumption from abroad, as the following figures will show :—

	GALS.			VALUE IN RUPEES.
1902-3	1,118,127	...	...	19,56,045
1903-4	587,434	...	...	9,24,523
1904-5	726,808	...	...	11,19,793
1905-6	901,505	...	...	14,40,805
1906-7	1,468,724	...	...	26,33,724

There are, at present, over a hundred and fifty mills, large and small, in India where oil is expressed from oil-seeds. It would be unfair not to mention here that these mills do, to some extent, atone for what might have been a total exodus of raw products from the country, getting, in exchange, the oil expressed from those products, for our own consumption. The figures are as follows :—

	GALS.			VALUE IN RUPEES.
1902-3	4,867,989	...	...	67,45,439
1903-4	6,135,910	...	...	83,33,315
	GALS.			VALUE IN RUPEES.
1904-5	4,829,722	...	...	62,40,029
1905-6	3,796,248	...	...	53,99,475
1906 7	2,991,020	...	...	46,77,307

Such, then, is the condition of the trade in oils and oil-seeds. It need not be pointed out that, when we export our raw products, we obtain only barely the cost of production of the article, and do not in any way give employment to our

Ideal condition
of Trade.

labourers, other than cultivators, while in re-importing oil-seeds or importing oil from abroad, we have to bear, on the one hand, the whole of the cost for freight, both ways, and on the other, the cost of production of the oil abroad, on a much higher scale than we would have, under the same conditions, to pay our own starving labourer for having the same work done. The ideally healthy condition, therefore, of this trade, as also of many others, is to retain in the country so much of the raw material and unmanufactured article as is required for home consumption, to spend on the surplus as much local labour as possible, under the conditions of the country, and to export the manufactured and finished article abroad. This principle, if observed, will not only give ample employment to our indigent teeming millions who are annually being swept away through sheer starvation, but will also otherwise be most beneficial to the yielding properties of our soil, as I hope presently to show.

The remains of almost all the oil-seeds I am going to deal with, after they have been exhausted of their oil,—oil-cakes, as they are called—still contain in them extremely valuable and important elements of fertility, namely, nitrogen, phosphoric acid and potash. Some of these oil-cakes, again, constitute a very highly concentrated food for agricultural and farm-house animals. From the agricultural point of view, therefore, the gigantic export of oil-seeds, instead of only the oil extracted from them, is gravely injurious to the country. A vast quantity of valuable manure is thus annually irreparably lost. The manurial constituents thus lost to the soil, every year, spell ever-increasing poverty to the country and this will probably be traced as one of the causes of the recurring famines of India. In this connection, I might also point out that it is rather bad economy to use edible oil-cakes for manurial purposes. I have reason to believe, however, that the price of some of the purely manurial oil-cakes having gone up, owing to large demand, in some parts of the country, edible oil-cakes are being largely used as a substitute. This is what should not be.

Oil-cake as
manure and
animal food.

Effect of export
of oil-seed on the
soil.

While on the subject of manures, it will not, I hope, be thought inappropriate if I mention, in passing, that we burn away, as fuel, a large portion of the animal dung,—a very rich manure,—and export a considerable quantity of manures, as the following figures, for the last two years, will show :—

	TONS.				VALUE IN RUPEES.
1905-6	131,656	...	...	...	70,97,038
1906-7	164,075	...	...	...	1,01,54,892

What will, no doubt, appear to be more surprising is the fact that, out of the total manure exported, as quoted above, oil-cake manure forms a very large fraction, *viz.* :—

	TONS.				VALUE IN RUPEES.
1905-6	37,127	...	...	...	16,99,186
1906-7	58,144	...	...	...	40,09,381

It will thus appear that the export of oil-seeds, instead of only the oil expressed therefrom, impoverishes the country in three ways, namely,—first, by denying our labourers the employment that legitimately ought to belong to them, secondly, by constantly denuding the soil of its own product of valuable manurial constituents, and lastly, by depriving the cattle of a very rich and concentrated auxiliary food. We have to admit with regret, on the other hand, that the labourer is starving himself to death from want of work and wages, that manure represents one of the ryot's main wants (the other being water) and that the solution of the problem of preservation of cattle from constant famine or scarcity is daily becoming more difficult. The sooner the matter receives your attention, the better ; and I earnestly appeal to you to interest yourself in it and devise early means of remedying this sad state of things.

So far as I have been able to ascertain, the more important oil-seeds are :—Mustard or rape ; linseed ; sesamum or gingelly ; castor-seed ; ground-nut ; earth-nut or pea-nut ; cocoanut ; *Karanj* ; safflower ; niger-seed ; cotton-seed ; poppy-seed ; radish-seed ; and *Mahua* seed. There may, perhaps, be a few other kinds of oil-seeds commercially used in certain

localities, but I have not been able to come across them, as yet.

Besides the oil-seeds enumerated above, there is a large body of seeds in the country, yet unexplored and unexploited, which are likely to yield a considerable percentage of oil. No definite information is available with regard to these ; and I believe there has not been much serious investigation undertaken to ascertain their property and economic value. It will,

Probable
oil-seeds.

no doubt, be very interesting, for instance, to know the yield of oil, respectively, of the nuts and stones of the various fruit products of the Indian forests. The information, beyond being of great academic value, might open up a considerable field for commercial enterprise. Researches ought to be set on foot to get at the probable relative economic value of these bye-products from the chemical, physical and therapeutic points of view. Here is an extensive field for earnest work of great promise, entailing but small outlay of capital. Mention might be made, in passing, that the seeds of the custard-apple (*Anona squamosa*), lichi (*Nephelium Litchi*), loquet (*Eriobotrya japonica*), jack-fruit (*Artocarpus integrifolia*) promise to yield good results. Then again, it is generally believed that the ripe seeds of many of our kitchen vegetables, such as the bottle gourd (*Lagenaria vulgaris*), karela (*Momordica Charantia*), uchhe (*Momordica Muricata*), dherash (*Hibiscus Esculentus*), phuti (*Cucumis Momordica*), shasha (*Cucumis Salicis*) contain a large percentage of oil ; and I have no doubt that, regarding a few of these, at any rate, research will confirm this common notion. Experiments have proved successful in extracting oil from the seed of tamarind, bakul, nim and the vegetable-marrow.

The genus *Brassica*, Linn, comprises over 150 different forms, including not more than 80 or 90 species. But practically only three varieties of it are of commercial interest, namely, the Indian mustard—vern. *Rai*—[*B. Juncea*], Indian rape—vern. *Tori*—[*B. Napus*], and Indian Colza—vern. *Sarson*—[*B. Campestris*]. There are several other varieties produced in different localities, but their influence on the trade is not so very marked.

Mustard, Rape
and Colza.

The total area under rape, mustard and colza for the last five years, including their estimated yield of the crop, is as follows :—

			ACRES.		TONS.
1902-3	{ Pure	...	3,421,883	...	521,926
	{ Mixed	...	2,335,000	...	516,000
1903-4	{ Pure	...	3,583,445	...	623,206
	{ Mixed	...	2,429,000	...	542,000
1904-5	{ Pure	...	3,640,000	...	540,400
	{ Mixed	...	2,509,000	...	336,000
1905-6	{ Pure	...	4,002,800	...	563,600
	{ Mixed	...	2,026,000	...	398,000
1906-7	{ Pure	...	4,127,792	...	636,900
	{ Mixed	...	2,210,000	...	424,000

In the above table, "pure" means seed sown by itself and "mixed" means seed sown in the same field with other crops. The total of the "mixed" crop is estimated, very roughly, by adding up the areas occupied by the scattered plants. (*Fide*. Agricultural Statistics of India, 1901-1905, Vol. I, p. 115.) Out of the above area and tonnage of the crop, United Bengal and Assam contributed a very large share. Thus, for instance, in the year 1906-7, Bengal, Eastern Bengal and Assam had 2,196,800 acres under this crop, yielding an estimated crop of 389,100 tons, being over a third of the totals for the whole of India, including the Native States. Compare with this total, the export of the mustard and rape seed from the country, during that same period :—

	CWT.			VALUE IN RUPEES.
1902-3	3,979,172	...	...	2,52,04,700
1903-4	4,492,748	...	...	2,57,63,223
1904-5	5,239,281	...	...	2,79,56,736
1905-6	2,088,157	...	...	1,30,73,614
1906-7	3,776,438	...	...	2,52,35,617

Besides the export of the seed, during the same period, we exported oil expressed from mustard as follows.—

	GALS.			VALUE IN RUPEES.
1902-3	314,792	...	...	4,79,649
1903-4	346,174	...	...	4,84,835
1904-5	432,752	...	...	5,58,762
1905-6	338,543	...	...	5,28,744
1906-7	273,684	...	...	4,90,893

The balance of this important oil-seed and the oil compressed from it has been consumed in the country. In our part of the country—Bengal—mustard oil is extensively used in the kitchen, where most of the oil is used up. The mode of cooking prevalent here necessitates a very large quantity of oil. Almost all the dishes are curried: previous to being curried, all the constituent vegetables and fish have got to be fried: and mustard oil is generally used for this purpose. On account of the great demand for the oil and the ruling high price of mustard-seed, the manufacturer has taken to considerable adulteration of the oil in the process of manufacture. Pure mustard oil is a great desideratum of the Bengali kitchen, and is a thing almost as rare in the market as the dodo in Madagascar. Calcutta mill-owners—mostly Bengalis themselves—before expressing the oil, mix with the mustard-seed, sesamum, cotton-seed, niger-seed, poppy-seed, safflower-seed, *maluta*-seed, radish-seed and *Tara*-seed with impunity. At one time, the metropolitan health-officers exerted themselves with laudable courage to put a stop to this mal-practice and instituted many criminal prosecutions against evil-doers, for offering for sale to the customer, as mustard oil, an article very different. But then, those mill-owners formed themselves into a ‘committee’ and began selling the oil, openly calling it “adulterated mustard oil,” although the retailer continued to sell the oil as mustard oil, pure and simple. The monopoly of the trade being with them, they have, in this manner, succeeded in defying the law and have placed the public absolutely at their wit’s end. Coming from the mill, the oil undergoes, to my knowledge, further adulteration at the *aratdar*’s (the middle-man) godown. There are various oils, such as betching oil, vacuum oil, etc.,—both mineral and vegetable—of the lowest grade, chiefly imported from abroad, which are again mixed up with the mill-oil, in order to secure to the middle man his share of the profit. By the time, therefore, the oil reaches individual hearths, it becomes totally unfit for human consumption. This condition of affairs does to a large extent account for ill-health and high mortality in Bengal.

In order to keep up and maintain the high price of mustard oil in the market, again, the ‘committee’ of the Indian

section of the Calcutta mill-owners, from time to time, close their mills, whenever they find that there is a larger stock of oil in the market than there is demand for it, to warrant a fall in the ruling price. This mode of artificially maintaining a high market is very prejudicial to public interests. The public has to bear the entire cost of closure of the mills, as also the interest lost on the rolling-stock and capital account of the mill. Instead of following this short-sighted policy, dictated purely by low, selfish motives, the mill-owners, I believe, can have their double satiety, as well as be true benefactors of the country, should they adopt the mode of expressing oil, by the most up-to-date approved process, from each individual kind of seed and sell the same as such, and leave the somewhat criminal work of adulteration, to be done by the middleman, as best as he chose. If the market of one kind of oil appeared or threatened to be dull, the manufacture of the oil, the market whereof was brightest, at the particular point of time, might profitably be taken up and continued, till the outturn of the mills had succeeded in making a decided impression on the market to forecast a discount in the ruling prices. By that time, the market of another oil and oil-seed might have improved, consequent on the practical refusal of the mills to deal with the same for sometime, to justify dealing therewith. By this process, I venture to submit, much larger fraction of the total produce of oil-seed would be dealt within the country, even with the existing rolling-stock and machinery, with the result that a very effective check would be placed on the dangerous export of oil-seed from the country, which I already had occasion to allude to. There would, again, be no necessity for closing the mills, the price of each kind of oil being totally under the control of the mill-owners. Everyone would also have the satisfaction of knowing the article he was buying, having no illusion of buying one description of article in lieu of quite a different one. This is the second matter I beg to call your special attention to in the earnest hope that you will find out effective ways and means of remedying it.

I do not intend uselessly to tax your patience with further notes on the mode of cultivation of the crop, the soil best suited for it, and the rotation of crops it permits.

The seed yields, on an average, to the extent of 13 to 14½ seers of oil to the maund and is sold at a price varying from Rs. 6-8 to 7-8 per bazaar maund, at Calcutta. The average yield of seed is about 10 annas per acre.

Sesamum Indicum or *Orientalis* (vern. *Til* ; *rasi*) is perhaps the next most important oil-seed grown almost all over India. It is supposed to be the very first oil-seed cultivated by man. It is ground exclusively as an oil-yielding seed and is probably indigenous in India. The fruit is a four-celled capsule, containing numerous seeds, which are either white, black, red or grey in colour, according to the variety. The white seed (*safed til*) and the black seed (*kala til*), however, are the only two varieties ordinarily met with in trade, the latter, again, being much more common and yielding a superior oil.

The total area under sesame during the last five years and the estimated yield of the crop are as follows :—

		ACRES.			TONS.
1902-3	{ Pure	4,435,648	...	...	493,587
	{ Mixed	717,000	...	...	80,000
1903-4	{ Pure	4,838,164	...	...	539,478
	{ Mixed	747,000	...	...	70,000
1904-5	{ Pure	4,178,700	...	...	300,400
	{ Mixed	600,000	...	...	35,000
1905-6	{ Pure	3,914,200	...	...	344,800
	{ Mixed	700,000	...	...	45,000
1906-7	{ Pure	3,844,100	...	...	441,100
	{ Mixed	775,000	...	...	90,000

The remarks already made about the "pure" and "mixed," (p. 9, *ante*) also apply to the above table. Bengal's share in the above totals, in the year 1906-7, was 494,900 acres, yielding an estimated crop of 64,300 tons of sesame. The total export of the seed for the same period has been :—

	CWT.		VALUE IN RUPEES.
1902-3	3,732,685	...	2,90,93,614
1903-4	3,512,650	...	2,42,89,443
1904-5	2,516,757	...	1,73,71,691
1905-6	1,685,208	...	1,46,93,032
1906-7	2,740,208	...	2,53,79,919

The black variety is a *maghi* crop, taking its rotation, in Bengal, after *aus* paddy and the white a *bhadai* crop and may

be taken in rotation after *aus* or *aman* paddy. The crop is sown in case of the *maghi* crop in *Asvin* and harvested in *Magh* and in the case of the *bhadoi* crop, sown in *Asar* and harvested in *Kartik*. The crop, on an average, yields about 15 maunds of seed per acre. The black variety is sold at Calcutta at a price varying from Rs. 6-12 to Rs. 7 per bazaar maund.

The oil is extracted in the same way as from mustard. The oil yield is on an average about 16 or 17 seers per maund of seed. The oil is very clear and limpid, free from any odour and does not deteriorate with age. The gingelly oil is frequently adulterated with ground-nut oil (*q. v.*, *post*) and is used to adulterate almond and mustard oil, as well as *ghee*. In many parts of India, gingelly oil is used for culinary purposes, in the same way as mustard oil is used in Bengal. It forms a very good medium for all perfumed hair oils, called *fulal tel*, and is very largely used for the purpose. The oil is exported in large quantities abroad, it is believed, for soap manufacture, as the following table will show :—

	GALS.			VALUE IN RUPEES.
1902-3	212,728	...	...	3,33,489
1903-4	285,711	...	...	4,24,403
1904-5	547,456	...	...	7,22,158
1905-6	308,310	...	...	4,44,293
1906-7	165,887	...	...	2,79,644

The oil-cake is a very good fodder for fattening cattle. To the oil are attributed certain medicinal properties in Hindu medical works, and it is claimed for it that, when carefully prepared, it is as good as olive oil for medicinal use. It has even been asserted that much of the olive oil imported into India is, perhaps, nothing but gingelly oil, made in Europe. With the advent of the new soap industry in India, this oil promises to be of great service to the country.

Linum Usitatissimum (vern. *Tisi* or *Mashina*) presents remarkable features regarding trade among
 Linseed. all the oil-seeds of India. To start with, in India, and probably nowhere else, *Linum* is cultivated only for its seeds, whereas, in other parts of the world, it is grown for the double purpose of obtaining the flax that it yields, as well as the seed. In spite of Government endeavours in the direction, the cultivator has, so far, spurned the idea of

growing it for flax production and not linseed. The plant that grows in India has established itself so firmly that, for the present, any attempt to divert the object of the cultivation is sure to meet with utter failure. Trials with foreign seeds, introduced in order to obtain the two-fold object, unfortunately met with sad failure: the plants yielded neither flax of good quality nor the wonted return of the seed. The cultivator naturally, therefore, prefers being satisfied with one crop, than running the risk of losing all.

There are two varieties of the seed, the red and the white variety, the former being by far the more common one, although the latter yields a larger percentage of oil of superior quality. The area under linseed in India and the estimated yield of the crop, for the last five years, is as follows :—

		ACRES.			TONS.
1902-3	{ Pure	2,592,237	...	...	359,568
	{ Mixed	621,000	...	...	122,000
1903-4	{ Pure	3,609,079	...	...	466,832
	{ Mixed	592,000	...	...	105,000
1904-5	{ Pure	3,747,400	...	...	298,400
	{ Mixed	647,000	...	...	49,000
1905-6	{ Pure	2,701,800	...	...	265,200
	{ Mixed	567,000	...	...	88,000
1906-7	{ Pure	3,028,300	...	...	306,900
	{ Mixed	633,000	...	...	113,000

Linseed can be grown on all kinds of soil; but the yield of oil from the seed varies according to the locality where it is grown. The seed of one part of India is richer in oil than that of another. Bold seeds yield more oil than small ones. Water-logging is said to seriously affect the outturn both of the seed and the oil. The fruit is a rounded capsule with ten divisions with a seed in each. It is generally grown alone, except in some parts of Bengal and the United Provinces, where it is occasionally sown broadcast on standing autumn paddy or with one or other of the *rabi* pulses or mustard. The average yield of the crop is about 5 maunds per acre. The export-trade of the seed is as follows :—

	CWT.			VALUE IN RUPEES.
1902-3	6,328,185	...	...	5,69,09,892
1903-4	8,616,356	...	...	5,74,41,762

	CWT.			VALUE IN RUPEES.
1904-5	11,182,009	...	...	6,32,87,256
1905-6	5,788,860	...	...	4,11,55,398
1906-7	4,378,826	...	...	3,25,98,578

The oil extracted from this important seed is extensively used for oil-painting purposes. It is essential for this purpose that the oil should be expressed exclusively from pure linseed, which has quick drying properties. The seeds that are composed of a large percentage of *oleine*, such as mustard or rape or sesame, etc., if mixed with linseed, before being expressed, impair, to a large extent, this important quick-drying property of linseed oil. Fresh linseed, pressed soon after collection from fields, yields a larger percentage of oil, which varies from 10 to 14 seers per maund of the seed. The price of the seed per maund ranges from Rs. 5-8 to Rs. 6 per bazaar maund. While on the one hand, we export a large quantity of linseed, we have, on the other, to import no trifling quantity of expressed oil from abroad, *e. g.*,—

	GALS.				VALUE IN RUPEES.
1902-3	232,608	...	...	...	5,02,914
1903-4	270,811	...	...	...	4,89,894
1904-5	315,924	...	...	...	4,78,548
1905-6	263,600	..	...	...	4,02,919
1906-7	304,486	...	...	...	4,98,941

It is now admitted on all hands that, if manufactured from carefully selected seed of Indian produce, as it is done by the Gouripore Oil Co., Ltd., or the Howrah Oil Co., Ltd., the oil is as good as any brand of the foreign manufacture, both as regards the quick-drying properties, as well as the freedom from any objectionable inherent colour, to render it unsuitable for being used for white or other light paints. The boiled variety dries quicker, with a better varnish, but is somewhat reddish in colour. It is remarkable, therefore, that we should have to import linseed oil from abroad, when we export so much linseed, for the sole purpose of yielding its oil. Complaints have been heard that the whole of the linseed crop cannot be locally treated, oil expressed and the product exported instead of the seed itself, because of the fact that there is no large local demand for the linseed-cake, which

is much too expensive for the poor cultivator to use as manure or as cattle-fodder. The oil-cake has, therefore, to be exported abroad to obtain its full price, thereby incurring the cost of freight and charges of transport. The oil-cake is exceptionally wholesome fodder for cattle but ought not to be too hard-pressed to be useful as such. Linseed oil-cake sells at Rs. 2 to Rs. 2.8 per maund in Calcutta. Something ought to be done to induce the cultivator to use the linseed oil-cake, in order to prevent the annual export of linseed and oil-cake from India.

Ricinus Communis (vern. *Arand*, *Bherenda*, *Renri*) is a plant of considerable importance in India, yielding the castor-seed of commerce. The chief uses of this important agricultural product are—

- (i) The feeding of the *eri* silk-worm on the leaves, in Assam.
- (ii) The manufacture of a paper-pulp from the stem.
- (iii) The production of the oil from the seed, for—
 - (a) Dyeing, tanning and soap-making purposes;
 - (b) Lubricating machinery, either by itself or in the shape of *palmine oil*,—a preparation of nitric acid completely agitated with castor oil;
 - (c) Burning in lamps;
 - (d) Medicinal use, as a mild, but effective, demulcent laxative, or for other purposes;
 - (e) Preparation of a varnish, by dissolving the oil in alcohol and incorporating the same with a solution of copal-tree (*Vateria indica*) exudation.
- (iv) The manuring of sugar-cane and other plantations with the oil-cake, as also the preparation therewith of a superior kind of burning gas, for illumination of public places, in smaller stations.
- (v) The supposed milk-increasing property of the leaves either in the form of juice given internally or as a poultice applied to the breast; and other sundry unimportant local uses, such as,—leaf as cattle-fodder, oil-cake as fuel, flower as an inducement for bees, in apiculture, etc.

Two varieties of the plant are commonly met with, large and small-seeded, the former yielding a larger percentage of oil, but the yield of the latter being more valuable as pure samples thereof constitute the castor-oil used in pharmacy.

Figures of the total area under the crop and the estimated yield thereof are not available. The plants, yielding the larger variety of seed, attain considerable height, are perennial and yield a larger amount of seed, while the other variety, which yields small seeds, is grown annually by an expensive and careful process and yields an average outturn of about 3 maunds of seed per acre. The harvesting in both cases is done by plucking the fruits with the hand. The collected seed-pods are stocked in a corner, covered up with straw or such other article, and allowed to stand, under pressure, for a week or so, when they are taken out, exposed to the sun, for two or three days, and then, husked either in the *dhenki* or with a heavy wooden mallet. A large portion of the total outturn of the seed is retained in the country, to be locally treated, while a considerable fraction is exported, as the following table will show :—

	CWT.				VALUE IN RUPEES.
1902-3	1,751,688	...	...	...	92,05,666
1903-4	1,566,838	...	...	...	69,19,562
1904-5	1,460,908	...	...	...	69,15,892
1905-6	1,298,624	...	...	...	78,66,786
1906-7	1,505,059	...	...	...	1,14,16,925

The current price of the seed, in the Calcutta market, is between Rs. 5-8 and Rs. 6 per bazaar maund.

The most important constituent of castor-seed is the oil, of which the peeled kernels afford about 15 to 20 seers to a maund of seed. The oil is extracted in either of the three following ways :—

- (i) *By decoction* : The seeds are partially roasted after being carefully deprived of their husk and then crushed, either by the *dhenki* or in a crushing mill. This meal, as it might be called, is then boiled with water and the mixture allowed to stand to allow the oil to come to the top, when it is drawn off. The oil is again passed through the

process of second boiling to dissipate a portion of its acrid principles.

(ii) *By expression* : The seeds are first cleaned with the hand, husk separated and thoroughly winnowed. The kernels are then dried in the sun and broken into a meal in the crushing machine. The meal is put into small bags made of canvas, or gunny, but preferably goats'-hair blanketing, and pressed either by the hand machine or the hydraulic press up to about $1\frac{1}{2}$ tons. The oil thus expressed is termed "cold drawn," but the yield is nearly 10 per cent. less than the process, in which either the kernel or the meal is moderately heated either by steam or in a shallow iron reservoir, so as not to scorch or decompose it, but to render the oil contained in it sufficiently liquid to make expression of the oil easier.

(ii) *By the employment of chemical solvents* : The process of obtaining castor-oil by means of alcohol or such other article is unknown in India. It is asserted, however, that, for medicinal purposes, an ethereal or alcoholic tincture of the seed acts in smaller doses than the oil.

The following is the export of oil from the country :—

	GALS.			VALUE IN RUPEES.
1902-3	2,073,573	...	...	24,68,222
1903-4	1,916,200	...	...	20,83,239
1904-5	1,632,106	...	...	16,43,982
1905-6	1,432,108	...	...	17,12,088
1906-7	1,445,636	...	...	22,22,015

And the following is the table showing the small import of the oil, during the same period :—

	GALS.			VALUE IN RUPEES,
1902-3	99	...	...	186
1903-4	284	...	...	671
1904-5	257	...	...	473
1905-6	286	...	...	1,022
1906-7	6,469	...	...	13,013

Attention is particularly requested to the sudden rise in

the import during the last year, which might be read as a danger signal.

The ground-nut is the seed of a very curious plant botanically called *Arachis hypogaea*. It is Ground-nut. unknown in a wild state in the country and the Bengali name (*Chiner Badam*—also called *mat-kali*) would lead us to believe that it reached us through China.

The plant is a herbaceous annual with low reclining branches of much the same appearance as a field clover. It so effectively covers the soil that, in many parts of Madras and Bombay, it is cultivated on soils to get rid of any trouble, some weed growing on it. It grows well on a loose soil, requires a fine tilth of the soil, with occasional irrigation at the first stage, and has to be kept clear of weeds. The crop matures in six months, and, with attention, yields as much as 20 maunds of seed-pod per acre. Heavy rain, about the time of harvesting, is disastrous, as the seeds are liable to germinate. The husk-waste is about $\frac{1}{4}$ of the weight of the entire pods. The nuts are frequently eaten raw or fried, as also various sweetmeats are prepared with it. On analysis, it has been found that "the residue from them, after the expression of the oil, far exceeds that of peas, and is even richer than lentil in flesh-forming constituents, while it contains more fat and more phosphoric acid than either of them." (*Dr. Muler.*) The following is the estimated area and yield of the crop, during the last three years :—

	ACRES.				TONS.
1904-5	459,700	...	...	...	214,900
1905-6	484,900	...	...	...	211,200
1906-7	601,400	...	...	...	299,000

The crop is principally grown in the Madras and Bombay Presidencies, and also in Lower Bengal, specially in the district of Murshidabad. The husked nut is sold in the Calcutta market at a price from Rs. 6-8 to Rs. 7 per bazaar maund.

The husked nuts yield from 15 to 20 seers of oil per maund, of a clear straw colour, rich in *oleine* (consequently, non-drying) which keeps well for a long time, without becoming rancid. The chief uses of this oil are,—

- (a) Adulteration with cocoanut oil in Madras, gingelly and mustard oil in Bengal, and with *ghee* throughout India.
- (b) Medicinal use, as a substitute for olive or salad oil.
- (c) Soap manufacture.
- (d) Dressing cloth.
- (e) Burning in lamps.

The 'cold-drawn' oil is of a superior quality to the oil expressed from the nut, after being lightly roasted, although, by the latter process, more oil is obtained. Oil exported during the last five years is as follows :—

	GALS.			VALUE IN RUPEES.
1902-3	84,785	...	...	1,50,499
1903-4	50,602	...	...	73,570
1904-5	48,582	...	...	62,547
1905-6	7,814	...	...	10,765
1906-7	16,608	...	...	26,203

It is worth while noticing the gradual fall of export from the year first quoted to the year before last, with a slight improvement in the last year. This means that we have been consuming at home, more and more of the oil-product. This leads me to the suspicion that our *ghee* and mustard oil are being more largely adulterated with this product; or, would it be that the new soap industry of India has been responsible for this increase in the home consumption of this oil? Let us, at any rate, hope it is so. The nut exported abroad, during the period under review, is as follows :—

	CWT.			VALUE IN RUPEES.
1902-3	1,035,659	...	..	71,57,905
1903-4	1,921,982	...	...	1,13,69,103
1904-5	1,674,421	...	...	96,77,683
1905-6	1,374,214	...	...	86,85,688
1906-7	1,725,239	...	...	1,25,54,682

The leaves and branches of the ground-nut plant are greedily eaten by cattle, while the hay is very nutritious. So also is the oil-cake, upon which the cattle readily fatten. The cake is also rich in manurial constituents :—

I must now make a few remarks on the comparatively new industry of cotton-seed oil. The export of cotton-seed (*Gossypium*) has been extensive enough :—

	CWT.			VALUE IN RUPEES.
1902-3	3,973,942	...	...	1,01,10,537
1903-4	2,677,226	...	...	66,83,153
1904-5	2,528,897	...	...	61,62,613
1905-6	3,891,339	...	...	1,02,17,600
1906-7	4,387,534	...	...	1,29,90,659

This is, perhaps, one of the cheapest oil-seeds in India, containing between 17 to 20 per cent. of oil, approximately. The oil can profitably be used in the manufacture of soap. It is very largely used as an adulterant of the more expensive oils, and for the manufacture of butter, lard and *ghee*. The cake is a good cattle-food and fertilizer of the soil and is a valuable agricultural asset, and much of what I had occasion to refer to already applies, with double force, in this case. The cotton-seed cannot be pressed in our *ghanis*, with profit, as much of the oil is soaked up in the lint and husk. It has, therefore, been necessary to set up oil-mills, in the cotton districts, to treat this seed with the latest up-to-date appliances for delinting, hulling and pressing the seed. The price of the seed averages from Rs. 2 to Rs. 2-8 per bazaar maund at Calcutta.

This important oil industry, principally of the Madras Presidency,—namely, the cocoanut oil,—Cocoanut oil. demands a few remarks. It is interesting to note that the discovery of later oil-refining processes and the importation of a considerable quantity of odourless mineral oil into India, having no colour at all, is playing havoc with this industry. This mineral oil is very largely mixed up with the first-class cocoanut oil—*e.g.*, the 'Cochin' oil—and sold in the market as such. Upon examination of the various hair oils, now offered for sale, it was found that nearly 70 per cent. of these oils were merely perfumed mineral oil. The export of cocoanut oil for the last five years is as follows :—

	GALS.			VALUE IN RUPEES.
1902-3	2,015,830	...	...	29,64,150
1903-4	3,379,631	...	...	48,81,588

	GALS.			VALUE IN RUPEES.
1904-5	2,021,193	...	...	29,17,361
1905-6	1,508,424	...	...	22,26,673
1906-7	959,772	...	...	14,17,794

The oil expressed from the seed of *karanj* (*Pongamia glabra*) is used for the purpose of adulterating oils that are not meant for use as a salad oil or for culinary purposes, *c.g.*, the burning castor-oil. The oil is somewhat strong in flavour, and is said to be bitter to the taste.

Kusum or safflower (*Carthamus tinctorius*) is very largely cultivated in India. It affords an oil-yielding seed as also dye of a rich delicate shade of rose-pink. Though the export trade of the dye has dwindled down to insignificance, it has, in spite of the cheap aniline dyes, maintained its position in India, on account, no doubt, of the value of its seed as an oil-yielding product. The seed yields between 5 to 6 seers of oil to the maund, and is sold in the Calcutta market at a price varying from Rs. 2-8 to Rs. 3 per maund. The seed is largely mixed with mustard or gingerly before expressing the oil.

There is a common notion prevalent in Bengal, at any rate, that mustard does not yield up all the oil, unless it is mixed up, in certain proportion, with *Guja* (or, *Sirguja*)—the Niger-seed (*Guizatia Abyssinica*). It requires no manure to grow; and very little attention suffices for the crop. The seed is thrown broadcast after the soil has received a ploughing or two in the *Kartik* and the crop is ready for harvest in 5 or 6 months, yielding, on an average, about 10 maunds of seed to the acre. Its export during the last five years is as follows :—

	CWT.			VALUE IN RUPEES.
1902-3	48,990	...	...	2,78,084
1903-4	42,559	...	...	1,78,338
1904-5	63,585	...	...	2,70,079
1905-6	44,670	...	...	2,53,056
1906-7	95,411	...	...	6,08,726

It will be noticed that the export of even this minor oil-seed has also been steadily on the increase. The seed fetches

a price of between Rs. 5-10 to Rs. 5-14, in the Calcutta market and yields about 11 to 12 seers of oil per maund.

Poppy-seed or *Posta*, as it is called in the vernacular, is, as must be well-known, the seed of *Papaver* Poppy-seed. *Sumniferum* and is chiefly exported to Europe. The oil is clear and limpid, and, of late years, is used locally to adulterate mustard and other culinary oils and *ghee* and abroad to adulterate salad or olive oil. The oil-cake is a good cattle-food, but is rarely met with in Bengal, owing to the fact that not much oil is separately expressed from this seed. The export of poppy-seed is as follows :—

	CWT.		VALUE IN RUPEES.
1902-3	966,220	...	... 82,45,096
1903-4	1,315,074	...	... 87,45,953
1904-5	1,362,599	...	... 78,43,018
1905-6	796,511	...	... 60,22,406
1906-7	802,615	...	... 65,77,231

The seed yields from 14 to 16 seers of oil to the maund and is sold in the Calcutta market at a price varying from Rs. 6-12 to Rs. 7-4 per maund.

The seed of the ordinary kitchen vegetable of the cold season, called *mula* or *murai* (*Raphanus* Radish-seed. *Sativus*) has come to be used rather extensively, of late, in the preparation of 'commercial' mustard oil. It yields a very large percentage of oil, namely, about 17 or 18 seers per maund, which has a pungent smell,—a quality that strongly recommends itself to the manufacturer of the 'adulterated mustard oil' as giving it the natural pungent smell of the pure mustard oil, and thus makes detection of adulteration more difficult. The price, again, is very favourable, being only about Rs. 2 per bazaar maund in Calcutta.

For the preparation of the seed, the vigorous plants are drawn in *Paus*, the lower half of the tubers cut off, replanted and allowed to seed. When the pods ripen, they are collected and seeds taken out.

The last seed I wish to make a few remarks upon, is the seed of *Mahua*, *Mowa* or *Mowra* (*Bassia latifolia*). Mahua-seed. The seed-kernels of the *Mahua* fruit, as commercially found in the Calcutta market, go by the

name of *Konchra*. The *Mahua* tree supplies large stores of food : the yellow waxy flowers are eaten both raw and cooked, and is largely used in the Indian distilleries. The fruit is also edible and the seed-kernel affords a valuable oil, remarkably suitable for soap-making and lubrication of machinery. The oil is, however, very largely used in Calcutta and elsewhere, only for being adulterated with mustard oil, coconut oil and *ghee*. The export trade of the seed is as follows :—

	CWT.		VALUE IN RUPEES.
1902-3	254,036	...	... 15,08,331
1903-4	493,673	...	... 24,76,559
1904-5	653,446	...	... 30,81,271
1905-6	337,860	...	... 17,89,556
1906-7	116,710	...	... 7,56,286

The kernel yields about 13 seers of oil to the maund and fetches a price of about Rs. 4-6 to Rs. 4-8 per maund.

I have, after all, come to the close of this brief review. Before retiring, I beg to express my deep gratitude to you for affording me this opportunity of waiting before you with these words. I sincerely regret having taken so much of your valuable time. But, having said so much, I feel, I have not said enough, and that much still remains to be said on the subject. It is my intention, however, to continue my researches ; and an occasion will probably arise, when I shall, again, beg of you to grant me the privilege and honour of making my further submissions on the subject. On this occasion, however, if I have but succeeded in convincing you of the importance of the subject, which takes its place, I venture to submit, only next after food-grains, demands, and if it receives, your earnest and best attention, I shall persuade myself that I have not detained you quite in vain.

THE ARTS AND INDUSTRIES OF TRAVANCORE.

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According to Ruskin, "Life without Industry is guilt, and Industry without Art is brutality.....but beautiful Art can only be produced by people who have beautiful things about them, and leisure to look at them." This ideal was understood and maintained long ago in India from the times of the Puranic Rajahs of old.

The arts and manufactures of India which from time immemorial have brought fame and wealth from far off regions have remained the wonder and admiration of the world to this day. Whatever might have been the origin and whatever the uses of the traditionary arts and industries of India and their place in the industrial and economic life of her people, there can be no manner of doubt that history has given its impartial verdict in favour of their superlative beauty and excellence of workmanship. Western scholars have not failed to note this fact from a comparative study of the History of India with that of other countries, and have given to the world the results of their observation in terms of sympathy and genuine admiration. In speaking of the Indian arts and manufactures, Sir W. W. Hunter observes :—

"In architecture, in fabrics of cotton and silk, in goldsmith's work and jewellery, the people of India were then unsurpassed."

Dr. Buist, Editor of the *Bombay Times*, speaking of the History of Indian Industry says in his 'Notes on India':—

"The carving of its wood work, the patterns, colours and texture of carpets, shawls and scarfs, admired for centuries, have since the Great Fair of the world, been set forth as patterns for the most skilled artificers of Europe to imitate. From the looms of Dacca went forth those wonderful tissues that adorned the noblest beauties of the Court of Augustus Cæsar, bearing in the Eternal City the same designation sixteen centuries ago as that by which cotton is still known in India; and the abundance of Roman coin and relics up to our time, occasionally exhumed yet preserves traces of

the early commercial connection between the two most wonderful nations in the world—those of the Cæsars and the Moghuls.”

This capacity for artistic excellence which has continued to exist more or less to this day is not confined to any particular locality, but is to be found everywhere in India. The indigenous industries are carried on all over the continent. In every village until quite recently all the traditional industries were found thriving. The village community of India was a body corporate in which the artisans played an important part. The whole community was provided for, every man in it had his ordered place and profession. It was the stronghold of the traditional arts and industries. The occupations were hereditary and all persons following the same professions in course of time, crystallised into the several castes. When the arts and industries passed out of the village, the caste system still afforded the best defence against the encroachment of foreign fashions. By its tenacity and exclusiveness, the caste system has preserved the artisan classes from contamination and degeneracy, and the experience of ages gained in doing the same kind of work from father to son in endless chain of succession, has stamped a hereditary capacity for artistic work on our artisan classes. So much so that “the mere touch of their fingers trained for 3,000 years to the same manipulations is sufficient to transform whatever foreign work is placed for imitation in their hands, ‘into something rich and strange’ and characteristically Indian.”

Though the indigenous industries were thus fostered and sustained, it was chiefly through the encouragement given by the ruling princes and chiefs and the cultivated tastes of the common people that the arts of India were brought to perfection. Every native ruler entertained a large number of excellent master-workmen in his palace. They had their salary and their daily rations for their lives from the exchequer and were provided with the materials for their work. It was under such court patronage that the arts and industries grew and attained a high degree of perfection. As was justly remarked by Coleridge, “the darkest despotisms on the continent have done more for the

growth and elevation of the fine arts than the English Government. A great musical composer in Germany and Italy is a great man in society and a real dignity and rank are conceded to him. So it is with a sculptor or painter or architect.....In this country, there is no general reverence for the fine arts ; and the sordid spirit of a money-amassing philosophy would meet any proposition for the fostering of art, in a genial and extended sense, with the commercial maxim *Laissez faire*."

Since the advent of the European nations there came a change over the country ; and when the country passed under British rule the overwhelming importation of the European manufactures which followed in their wake worked immense ruin on the hereditary native craftsmen. Under the British rule which secures the freest exercise of individual energy and initiative, the restraints imposed by caste exclusiveness became considerably relaxed to the marked detriment of those handicrafts, the perfection of which depends on the hereditary processes and skill. The foreign rulers of India patronised the European manufactures even at the expense of native industries. The native rulers and nobles also imitated the ruling class in their tastes and filled their palaces and mansions " with flaming Brussels carpets, with Tottenham-court furniture, with cheap Italian Mosaics, with French oleographs, with Austrian lustres and with German tissues and cheap brocade." The village artisans neglected by the ruling classes and chiefs and nobles and unable to hold their own against the fierce and merciless competition of the Western manufacturers, were forced to abandon their hereditary occupations and turn to agriculture or mass together in hundreds and thousands in squalid and insanitary surroundings to assist in the manufacture of goods with the aid of machinery recently imported into India.

There can be no question that machinery will eventually kill some of our handicrafts, but there are others to which manual labour is best suited, and these will thrive and bring up a contented and fairly prosperous class of artisans if they are sufficiently patronized by the higher and middle classes,

That Travancore has long been famous for the excellent workmanship of her artizans may be gathered from the following extract from a letter addressed to His Highness the late Maharajah by Colonel H. P. Hawkes, President of the Madras Committee of the London Exhibition of 1886 :—

“We feel that the best and most striking exhibits will come from Travancore. Your ivory carving is beyond doubt the best in all India. Your jewellery is approached by none that I have seen. The steel work inlaid with gold is peculiarly interesting and judging from the photograph Your Highness is good enough to send me, your wood carving must be very fine.”

Such excellence has been due to the liberal encouragement and patronage of the rulers of the land. The occupants of the throne of Travancore have as a rule been personages of great learning and culture, and not a few of them have themselves been votaries of the arts they developed and patronized.

Travancore Music.—Music according to Herbert Spencer is the finest of the fine arts. As one of the fine arts, it received special patronage through successive Hindu dynasties and was practised and cultivated by *Pandits*, Princes and Princesses and by the well-to-do householders. Religion bound up as it is with everything in India naturally exercised a most powerful influence upon music as upon other arts. “We have hardly any festivity in the country,” said the late Justice Sir T. Muthuswamy Aiyar, “domestic or national, in which an important part is not assigned to music.”

According to Mr. Day, a great authority on South Indian Music, Travancore owes to the influence of Tanjore much of its excellence in music and other fine arts.

The school of music in vogue in Travancore is the *Carnatic*. The Hindustani school has also been practised, but it has not taken a deep root here. It is now enjoyed only as a rarity. Besides these two systems, there is yet a third, known as *Soupanam*. It is an indigenous style of music peculiar to Malabar and Travancore at present, and is apparently a trace of the once prevalent Dravidian music. Hindu music has from time immemorial been patronised by

the Sovereigns of Travancore. The names of many musicians who adorned the Court of Rama Varma Kulasekhara Perumal Maharajah are still remembered. That illustrious Sovereign himself was a great musician and his compositions are still sung not only in Travancore but in countries beyond it. The most celebrated musicians of the day in Southern India, *viz.*, Maha Vaidyanatha Iyer and Raghavier were pets at his Court. His nephew and successor Rama Varma, G.C.S.I., was another great musician and singer.

Painting.—"Painting" it has been well said, "is the intermediate somewhat between a thought and a thing." The history of painting in Travancore is the history of the revolution effected in India in that branch of the fine arts through the labours of Western artists, an advance which has been kept up here by the genius of local talent.

That painting had reached a high state of excellence in India is clear from the old Sanscrit poets and dramatists. In Kalidasa's 'Sakuntala,' Dushyanta paints the picture of his banished Queen.

Travancore has picked up the opportunity of internal peace, which British rule has given us, for the development of her arts. She has produced several painters of merit. And the recent Census of 1901 gave 919 as the number of painters for this little State.

The first impetus to painting on modern lines in Travancore was given by that talented Maharajah, who has already been referred to above as the great musician and patron of music. His Highness invited one Alagari Naidu, the best painter of the day, from Madura and he trained young Raja Raja Varma of Kilimanur (the great Indian artist's uncle) and several others in the art of painting. Ravi Varma, whose fame now extends to Europe and America, received his early training from his uncle.

For painting to be truly successful in India, "it must be national painting." The success of Ravi Varma's pictures has proved the truth of this statement. He was ably assisted by his late brother C. Raja Raja Varma, who was equally distinguished in the art, and by his sister, yet unknown to fame. Ravi Varma's paintings won prizes in the following Exhibitions :—

- (1) Fine Arts Exhibitions of Simla, Bombay, Poona and Madras.
- (2) The International Exhibitions of Vienna and Calcutta.
- (3) The Indian and Colonial Exhibition of London.
- (4) The World's Exhibition at Chicago.

Architecture.—The prevailing style of architecture is the Dravidian. Though the Dravidians were enthusiastic builders and embarked on the most splendid undertakings, yet all their efforts were devoted to the single service of Religion. The earlier specimens of the temples constructed in this style are the most perfect and the changes have been from bad to worse. Besides the temples in the Dravidian style, there is a large number of temples in Travancore, built on a model peculiar to Malabar. In architectural grandeur they cannot be compared with the lofty structures of the East Coast.

The construction of private buildings differs considerably from that on the East Coast. The typical 'Nayar' house is situated in a large compound enclosed by a wooden fence or mud wall with thatched roof which is renewed every year, thus avoiding the expense of re-building the wall often owing to the heavy rains. The extent of the compound varies with the affluence of the owner, but is large enough in the villages. Though it is considerably less in the towns it is impossible to find a 'Nayar' house without a decent compound. The gateway opening into the compound is surmounted by an imposing structure called '*Padippura*,' a framework of wood thatched or tiled, sometimes very attractively and artistically done. The house stands in the north-eastern portion of the compound mostly facing towards the east. At the south-western corner lies the *Kavoo* or grove of trees, dedicated to the abode of snakes—a portion considered sacred. To the east of the *Kavoo* is the bathing tank with the *Kulappura*, a cool shed forming a canopy over the steps of the tank affording facilities for privacy and protection from the inclemency of the weather. There is also a splendid garden containing everything needed to secure to the owner all the necessities of life. The cocoanut, the jack, the areca, the plantain and

the mango trees are the most important ones to be found in every garden. The pepper vine is invariably seen clinging to these trees. Edible roots, such as tapioca, are to be found growing amid the clusters of trees and a tall *peslu* fence at one corner bears the betel leaf vine. In the midst of this garden stands the Nayar house, on an elevated basement, generally three feet in height. As one enters the premises, the first thing that greets the eye is a well-built ante-chamber, the southern portion of which is an open hall with an ornamental plank ceiling above. At the northern end is a fine snug wooden room 10 feet square. Both these are used by the *Karanavan* or chief member of the family who receives visitors there. Beyond this is the big open yard called *Millam* surrounded by a cluster of buildings. It is an oblong space not less than 30×40 feet and is kept scrupulously neat. To the west of the open yard is the main house. The central portion of the main house is known as the 'Arappura,' a strong building entirely made of wood to secure the valuables of the house. It has only one door on the east made of massive *anjili* plank fastened by one or two terrific-looking iron locks known as the *Nachi-poottu*. The door leads to an open verandah in front bordering on the *Millam* more than 6 feet broad and of the same length as the *Arappura* itself. The plank ceiling of the verandah is elaborately carved. Behind the *Arappura* is a big *Nalukettu*, the number varying according to the opulence of the Tarawad. These are provided with numerous comfortable rooms for all the women and children of the family, the and *Karanavan* seldom visits these parts of the house. On the north side is the kitchen, a detached building with an open hall for dining, say 40×12 or 15 feet. In front of the kitchen to its east, is the well, from which water for drinking and cooking is drawn. The cattle-shed of the house is situated generally to the south or south-east of the main house. *Tekkettu* is a small building situated to the south of the main building and kept sacred for *puja* to the family deity. Every house has also a *Matam* where the Brahmin visitor is lodged and fed.

Sculpture.—Sculpture and architecture always go hand in hand and it is by the delicately sculptured images of gods and goddesses in the temples that the architectural beauty

of the shrines is judged. In the temple of Sri Padmanabha at Trivandrum there is abundant evidence of excellent sculpturing on stone.

Carving.—The art of carving has been known in Travancore for a long time. It is as ancient as the temple architecture, and a naturalistic style has sprung up in Travancore. Carving in stone has already been referred to in connection with sculpture.

The most common substance on which the workman can exercise his skill is wood, of which Travancore has an abundant supply. Wood carving has long been practised in Travancore in connection with the construction of temples in indigenous Malabar style and the construction of houses and other buildings. In the making of cars, palankeens and *I'ahanams* required in temple services and processions and always richly, minutely and delicately carved, the carpenter displays his consummate skill and high workmanship. Teak is the most popular wood, but sandalwood with its fragrant smell being valuable is generally selected to show the delicate touches of the carpenter's tool.

When ivory carving was first introduced into Travancore is not exactly known. From the evidence that exists in the form of ivory works, such as palankeens, images of gods and representations of plants and animals, we are led to infer that carving in ivory must have been, if not indigenous, at least as old as the Aryan colonization of Malabar.

The most important work in ivory was a throne made for that great Maharajah, who reigned between 1829 and 1847. This is an excellent piece of workmanship and still adorns the old Durbar Hall at Trivandrum. His Highness' successor, Maharajah Martanda Varma exhibited a still greater interest in the furtherance of the Art, and in 1851 His Highness was enabled to present to Her Majesty the Queen an ivory throne elaborately carved and set with jewels. It was exhibited in the great Exhibition of London of that year and was much admired. It is a beautiful work, thoroughly Indian in design and well worthy of the purpose for which it was intended. It has now found a fitting place in the State rooms in Windsor Castle.

Ivory carving is done in the Trivandrum School of Arts

for the decorations of many articles of ordinary use such as the backs of brushes, hand glasses, combs, book racks, walking sticks, umbrella handles, &c. The required ivory is obtained from the State Forests themselves.

Besides wood and ivory, well executed designs are carved in cocoanut shells. The colour of the shell when polished is a fine dark brown, which becomes darker with age. The clean shells are subjected to elaborate carvings and mounted with silver, gold or ivory.

Weaving.

Next in importance to agriculture is the weaving industry, and among all the materials of our textile fabrics cotton undoubtedly holds the first place. For a long time it has been cultivated, spun and manufactured locally, and every village has had families of weavers and spinners who supplied all local demands and needs. But cotton spinning has nearly ceased to exist as almost all weavers now use only imported twist.

The Izhavas, Saliars and Patnools are the chief castes engaged in weaving, but there are also a few other castes who follow this profession. The following is the form of the loom in use by the majority of the weavers :—

The principal parts of it are the sley, the healds and the reed. The sley with its reed is suspended by two cards from the roof of the house and the healds by two minor cards. The lower portion of the sley consists of a piece of wood two inches thick and almost circular in sections with a groove cut along the top for the reception of the reed. At each end a short upright piece of wood is fixed and passes through slots cut in the upper portion of the sley. This is a piece of common grained wood about 3 feet deep and 213 feet thick with a groove cut at the bottom to form a cup for the reed, to fix it in a vertical position. In the middle there is a handle for the weaver to grasp and beat up the weft with great force, after the healds have divided the warp. The healds consist of a series of loops linked together, the warp thread being drawn through the space formed by linking two heald loops. The shuttle with the waft in it, is thrown across by one hand and caught by the other and so on.

The weaving of silk and woollen fabrics is unknown in Travancore.

Fibres.—

Plantain fibre.—The existence of fibre in the common plantain has probably been known in India from ancient times, but it attracted public notice only during the Crimean War, when owing to the stoppage of the importation of Russian hemp into England the Indian Government ordered an enquiry into the capabilities of Indian fibres. But nothing important was done in regard to plantain fibre owing to the abundance of other fibre-yielding plants and also to want of some simple and efficient machine for extracting the fibre. A few years ago the Government of Travancore deputed one of its officers to Ootacamund to acquaint himself with the methods of extracting the fibre, but for want of a suitable machine much good did not result from this mission. When weaving was introduced into the School of Arts, the Government procured through its Forest Department fibres extracted from plantains grown in the State and asked the Superintendent of the School of Arts, Trivandrum, to test them with a view to ascertain their fitness for weaving purposes. A few experiments were made and the results of these experiments are noted below :—

1. Of the 29 varieties of plantains grown in Travancore, fibres yielded by 12 were found to be the best for weaving cloths of fine texture and those of the remaining ones were only fit for coarse weaving and cordage. The fibres are silky in colour and glossy and sufficiently strong for a thread.

2. A few native tanning colours were tried and found successful in dyeing the fibre fast.

3. Washing with alkali commonly used by native washermen and with soda and soap were tried in the fibre and the fabric woven with it. These were found only to increase the strength and pliability of the material.

4. The fibre was found to possess peculiar advantages over other known varieties of fibres used for textile purposes. It possessed an almost exact resemblance to silk in the polish

of the thread, which it is found to retain after it is dyed with any colour, or boiled or washed.

5. The fibre needs no spinning operation like other fibres. It is ready for the loom after its extraction from the raw sheaths of the plaintain trees.

The machinery for extracting the fibre used in the Trivandrum School of Arts is simple in structure, comparatively cheap, and easily portable being small and light. It can be carried to the plantain gardens where the trees are cut and large expenditure in transit of the raw material would be saved thereby. The frame work is in teak. The scraping blade and the squeezing fluted rollers are fitted parallel to each other at the top and are worked by two separate strong steel springs controlled by foot levers. The additional mechanism for squeezing with the fluted rollers which work in advance of the scraping operation gives greater pliability to the plantain sheaths and renders the extraction of the fibre much easier. The fibre thus obtained can consequently retain the full length of the sheaths available, little or no breakage occurring in the process of extraction.

The machine-made fibre industry yields a good profit. An enterprising Indian of Tanjore who took the trouble of having some samples of the fibre extracted by him sent to London, found them valued from £ 25 to £ 35 a ton. He estimates the cost of extracting the fibre at Rs. 55 per ton, and allowing another Rs. 35 for putting the same on the market, or Rs. 90 altogether per ton, he calculates the profits at nearly £ 20 to £ 25 per ton. He states also that an acre of plantain garden yields one ton of fibre on an average. It has to be remembered that it has been usual hitherto to throw away the sheaths after reaping the produce, and if this refuse should yield so much as £ 20 per acre the industry should be a very paying one.

Plaintain trees of different varieties are grown abundantly all over the State, and in fact almost every Malayali house has its own plaintain trees behind it in the garden. The extraction of the fibre is only a simple process and as it does not affect the edible and valuable portion of the plantain tree there is a vast field open for a new and paying

industry which our capitalists will do well to put in hand before foreign capital steps in.

Cocoanut fibre or Coir.—Malabar has been rightly called the “land of the palms” and of these the cocoanut palm is the most important and widely cultivated. The cultivation of the cocoanut tree and the preparation of its various products seem to be occupations specially suited to the Malabar Coast, its dense population, its minutely sub-divided holdings and its easy water-carriage to the market. Each man here lives under his own palm trees and every traveller by boat on the lagoon can see the domestic labour going on at each threshold, the whole family busy in severing the husk from the nut, in spinning the fibre into yarn and so on. Of the several industries connected with the cocoanut, the Coir industry is the most important. The thick pericarp or outer wall of the fruit yields the valuable coir fibre of commerce. The fibre is tough, elastic, springy, easily manipulated within certain limits and eminently suited for manufactures where lightness, cleanliness and great indestructibility are required. It will stand water, it is almost impervious to wind and wave, or to damp and rain. Care should be taken to cut the cocoanut at the proper season. The fibre is much impaired by waiting for the nuts to arrive at maturity. The fibre is weak when cut earlier than is necessary, and if later, it becomes coarse and hard and requires a longer soaking and is more difficult to manufacture. The best season to cut the nut is in the ninth or tenth month. When the cocoanuts are cut the husk is separated from the nut and thrown into pools of fresh water and soaked for nearly two months. Travellers in boats can see heaps of these thrown into the back waters all along the way and easily recognize them from the offensive smell emanating from the rotten material in those places where the cocoanut abounds. When thoroughly soaked the fibrous parts are easily separated from the wood by beating with a stick resembling an ordinary rice-pounder but not so long, known as *Kuttuvadi*. This beating is invariably done by women. After separation the fibres are mixed and with the help of a rough country machine locally known as *rathu* (wheel) ropes are twisted.

This is also largely done by women. The Izhavas are largely engaged in this business and their women are very dexterous in rope making. Of the uses to which the coir is capable of application, the following extract from a pamphlet issued by an English trader will give a fair idea :—

“Coir is found suited to the production of a variety of articles of great utility and elegance of workmanship. It was at first only used for stuffing mattresses and cushions, but its applications have been enlarged and its value greatly increased by mechanical processes. Instead of being formed into rough cordage only, and mats made by hand by means of ingeniously constructed machinery the fibre is rendered sufficiently fine for the loom, and matting of different textures and coloured figures is produced while a combination of wool in pleasing designs gives richness and the effect of hearth rugs and carpeting brushes, and brooms for household and stable purposes, matting for sheep-folds, pheasantries and poultry yards, church cushions, hammocks, cordage of all sizes and strings for nursery men and others for tying up trees and other garden purposes, nose-bags for horses, mats and bags for seed-crushers, oil pressure, and candle manufactures are only a few of the various purposes to which the fibrous coating of the cocoanut is now applied.”

Coir string is universally employed in other parts of India in the construction of bamboo-houses. To these properties has to be added its great power of withstanding moisture on account of which it is in great demand for maritime purposes.

Areca nut fibre.—Besides the plantain and cocoanut fibres the areca nut fibre is also used in the School of Arts, Trivandrum, as a substitute for wool, in the manufacture of carpets. When dyed, it is hardly distinguishable from wool, and in fact, carpets woven with it look better and finer than woollen carpets while they are considerably cheaper. The discovery of the uses of this fibre is very recent and the work is at present confined only to the School of Arts, Trivandrum.

Oil pressing.—Next to coir making, oil-pressing, especially the manufacture of cocoanut oil, is the most important industry in the State. The cocoanut oil manufactured in Travancore is considered better in quality than that produced

in other countries. Mr. Mackenzie, the late Resident in Travancore and Cochin, observed that a ton of cocoanut oil from here fetches in the London market a few pounds more than that exported from any other country.

The oil is nearly white in colour and is largely used by the people of Malabar in cooking. It has a very agreeable smell and preparations made with it do not get spoiled while they taste better and keep longer. The oil is also used as medicine either by itself or boiled with other ingredients and for burning lamps and anointing the body. It is said to promote the growth of hair. The fat yielded by the cocoanut oil is largely used in Europe for the manufacture of candles, and according to 'Max', in *Capital*.—"Experiments made in the Philippines show that the oil can be made to produce a high quality of illuminating gas free from tar." The uses of cocoanut oil are thus manifold.

The method of preparing it is as follows :—The ripe kernel of the cocoanut is cut off the skull and dried either by exposure to the sun or by artificial means. It is then known as copra. The copra is cut into thin slices which are put into the presses, and oil is extracted therefrom. The apparatus of a native oil-press is very simple. It is made of the trunk of a large tree (either tamarind or jack) or a block of a stone, which is hollowed into the form of a mortar and planted on a raised ground. In this a big pole works as a pestle round and round. A wooden beam about 16 feet long pressing at one end closely against the foot of this mill with loud creaking noise has an arm projecting upwards at about a third of its length, which is attached to the head of the pestle. The mill is driven by men or oxen yoked at the farther end of the beam who pull it round and round. Every village has a few of these country mills and accordingly they are to be found scattered throughout the country. In addition to these country mills, machines for extracting oil worked by steam power have been recently introduced; there are three of them established at Alleppey; a mill has been newly started at Quilon.

Gingelly-oil is the next in importance. This is usually procured by giving the sesamum seeds frequent washings in cold water at first until all the brownish coloured matter is

removed and they look quite white. They are then spread to dry in the sun, after which oil is pressed from them, in the same way as cocoanut in country mills. The oil has healing properties. It is used for burning lamps and anointing. Some use it for cooking purposes. This, however, is the custom of the Tamils not the true Malayali.

The laurel or *Punnakka* oil comes next in importance. It is expressed from the seeds of the laurel tree. It is used mostly for burning lamps, but it gives a dim light.

The castor-oil is another important kind of oil. It is made from the large or small varieties of *Ricinus Communis*. It is an excellent laxative and is generally administered as a purgative. Oil that is made for burning lamps is expressed in the mills, but for medicinal use it is prepared by boiling.

The *Pultailom* or lemon-grass oil is in great demand in Europe. It has a very pungent taste and a strong odour of lemon. This industry may be said to have monopolised the trade in lemon-grass oil in European markets.

Veppa Ennai, the oil of the seeds of the Margosa, is of great medicinal value. The following oils also are used as medicines :—Peacock oil, Deer oil, Serpent oil, Pig oil or ghee and Fish oil.

Metal work—Precious metals.—Gold and silver are superbly wrought. The making of native ornaments gives the goldsmiths ample scope for the display of their artistic skill, and their workmanship is much admired.

A gold girdle or *Oddyonom* made in Travancore the other day was the admiration of the Madras ladies, and they were positive in their statement that no Madras goldsmith could have shown such finish in work. The *Oddyonom* is a waist-belt worn by young women and this one was a small ornament weighing about £ 10 sterling, but the finish and the polish of it were unsurpassable ; and yet this was the work of a goldsmith who earned only a rupee a day.

All the rich temples of Travancore have a large number of gold and silver vessels. The big *Vahanams* of gold and silver of Sri Padmanabhaswamy's pagoda at Trivandrum amply testify to the great claim that Travancore has for artistic work in gold and silver.

Brass, Copper and Bell-metal.—Almost all the household vessels in a high class or middle class Hindu family are of brass, copper or bell-metal.

In Travancore bell-metal cauldrons and copper cooking pots are made on a colossal scale as they are in great demand for the feeding-houses attached to the temples. Some of those in use in Trivandrum are so large that each can contain condiments to feed 5,000 persons at a time and so deep that a boy can swim in them if filled with water.

Iron and Steel.—Iron and steel are chiefly used for making agricultural implements, knives, razors, locks, &c. Superior knives on the English model are manufactured in Travancore. The D. P. W. Workshop does casting work in iron; lamp-posts, pipes and other articles are cast there, and most of the lamp-posts used in lighting the town of Trivandrum are those made in the Workshop.

Carpentry.—In the construction of temples and houses, the native carpenter plays an important part. The *Tachchusastram* or the science of carpentry prescribes in minute detail the rules of construction. The chief or head carpenters who prepare designs for buildings and have charge of the execution of the works, know the whole of that science by heart. They are, therefore, the supreme authorities "on the dimensions of the rooms, the height and dimensions of the door frames, the inclination of the rafters, and their number for the roof, the area of the open yards, the position of the beams and their sections", and indeed for every trifling detail to be followed in the construction. The abundance of good building timber found in the forests of Malabar and their extensive use in the indigenous style of architecture gives ample scope to the carpenter to display his ingenuity. The splendid wood carving for which Travancore is deservedly famous, which has already been referred to, owes its excellence to the dexterity and extensive technical knowledge possessed by the carpenters.

Boat-building.—A regular succession of lakes and backwaters connected by navigable canals and running in a parallel direction with the coast for a considerable length is a most remarkable feature of the Malabar coast. Almost all the important and busy towns in Travancore and Cochin

are situated along this line of water communication and as might be expected every description of merchandise as well as the whole produce of the country is easily conveyed through backwaters in boats.

In marshy tracts and in most parts of North Travancore water is the only highway of communication and a *Vallam* or canoe is thus an indispensable adjunct to every house. Men, women and children go in these from one house to another or to the market or to their respective avocations in the fields or elsewhere.

It is thus clear that there is a large demand for boats in the country. Accordingly we find that a large number of people are engaged in their construction or repair. The boats are of various sizes, from the small fishing boat, 8 to 10 feet in length and 2 feet in breadth, to the large, handsomely fitted up and richly carved cabin boats used by Royalty and other high personages. Teak, *Anjili* and *Tambagan* are the most important trees used in their construction, *Anjili* being the best and most popular.

Mining Industry. — There has been no geological survey of the State. The only minerals now worked are the plumbago and mica. The plumbago has been pronounced to be of inferior quality, though two mines are being worked by the Morgan Crucible Company. The company pays a royalty of Rs. 4 to 6 per ton to Government, according to the quality of the ore and in 1979 M.E. (1903-04 A.D.) the Sirkar realized a royalty of Rs. 11,134.

Mica is found at the bed of several tanks and in many places in the forests where water stagnates. But the quantity is small and the quality poor.

Besides these two, iron ore is largely met with; but there has been no organized attempt to undertake work in this line on a large scale.

Gold ore was found some years ago and tested, but it was thought not paying.

There can be no doubt that Travancore has a large mineral wealth, but the mineral resources of the State have not been exploited as yet. The Government have now in their service two young men recently trained in England in mining and these youths are now engaged in exploiting

the country. It is hoped that their labours will lead to the discovery of abundant and valuable mineral resources.

Manufacture of Salt.—Salt is a Government monopoly in Travancore as in British India, and in order to meet the wants of the people, salt is being manufactured by private contractors under an arrangement with the Sirkar according to which the expenses of the manufacture are borne by the manufacturers themselves. But the State carries out all the public works necessary for the general maintenance and improvement of the pans. The manufacturers sell all the salt manufactured by them to the Sirkar at a fixed rate. Locally made salt is as good as the foreign stuff. Not long ago a private contractor was permitted to manufacture salt locally and very recently a company of private traders has been formed. It has already begun work with 100 pans and the produce is said to be of very good quality. At a recent conference of salt officers held under the presidency of the Dewan of Travancore, it was resolved that the State should eventually be made independent of foreign salt by encouraging home manufacture. The future of the salt manufacturing industry is thus full of promise.

Pottery for Bricks and Tiles.—Pottery is a very ancient and important industry. In the Hindu lore the profession is sanctified by Brahma the Creator being designated the chief potter. There are no houses in the country even of the poorest classes which do not use earthen pitchers, water jars, cooking pots, frying pans, dishes and other vessels made by the potter. There is, thus, an immense demand for these in every village and the potter is, by virtue of his calling, an important factor in the village organization.

The potter's wheel is a very simple and rude contrivance and of this primitive wheel comes every day in every part of India, some of the finest pottery. It consists of a horizontal fly-wheel 2 or 3 feet in diameter loaded heavily with clay round the rim and put in motion by the hand. Once set spinning, it revolves for 5 or 10 minutes with a perfectly steady motion. The clay to be moulded is heaped in the centre of the wheel and the potter squats down on the ground

before it. When a few vigorous turns are given, away spins the wheel round and round still and silent as a sleeping toy, when at once the shapeless mass of clay begins to grow under the potter's hand into all sorts of faultless forms, which are then carried to be dried and baked as fast as they are thrown away from the wheel. Any polishing is done by rubbing the baked jars and pots with pebble. The Indian potter shows thoroughly artistic work in his creation and the red earthenware pottery of Travancore is one of the principal varieties of fancy pottery in which artistic effect is sought to be produced. Some very fine pottery is being made in the Trivandrum School of Arts.

The round tube-like hollow tiles of the East Coast, used only in South Travancore, are also made in the potter's wheel. But the indigenous variety of tiles peculiar to Malabar are manufactured in the same manner as the bricks. The semi-solid clay prepared according to the *recipe* known to every potter is spread on level ground and allowed to dry for two or three days. It is then cut into the required sizes and shapes by a sharp-edged piece of wood or other instrument and left to dry a little more. The bricks or tiles are then collected and headed into a kiln constructed in the form of a rectangle with a number of holes on all the sides. Dry twigs and firewood are strewn at the top and at the bottom of the heap and also one or more layers inside it are burnt. After sufficient burning they are removed and are ready for use.

Toddy Drawing.—Toddy is a saccharine juice obtained by excision of the spadix or young flowering branch of the palmyra, cocoanut, date, sago, and other palms, of which the first two are the most important. The process of drawing toddy is as follows. When the spadix is a month or a month and a half old, the toddy drawer begins his work by binding the sheath to prevent its expansion, after which he cuts about an inch off the end and then gently hammers the flowers, which are thereby exposed, with the handle of the knife or a piece of hard wood or bone. Finally he binds up the end with a broad strip of fibre. The hammering is repeated both morning and evening for 8 to 15 days, a thin slice being cut away

on each occasion till the spadix is ready to yield toddy which can be easily recognized by the chattering of birds, crowding of insects and other unmistakable signs. When ready the end of the spadix is fixed into a small pot and a small strip of leaf is pricked into the flower to catch the oozing liquor and to convey the drops without wasting clear into the vessel. The juice exudes and drops into the earthen pot. It is collected every morning when the vessel is emptied and replaced as before and this is repeated daily until the tree is exhausted and yields no more. The yield will be about half a gallon a day in the beginning but will gradually decrease, and after a period of about 40 or 50 days, stop. The juice of the cocoanut tree is sweet toddy. In the early morning it is a pleasant drink, but it ferments towards night and is intoxicating.

Palmyra toddy is, though agreeable, inferior to the cocoanut toddy. It is very intoxicating and is largely drunk by the lower classes after a hard day's work in the fields or topes.

Sugar, Molasses and Jaggery.—Coarse brown or black sugar is made by boiling down over a slow fire the juice or toddy drawn from the palmyra, the cocoanut or other palms. Jaggery is the hardened lump of the thick waxy syrup which is obtained by boiling for a considerable time, toddy with powdered lime.

If sugar has to be extracted, the boiling ceases a little earlier than is required for the making of jaggery, and when it is warm, it is placed in baskets and allowed to drain. The watery portion that drops into a pan placed below is molasses.

Cadjan, Mat and Rattan Work.—Cadjan umbrellas are a peculiarity of this coast, and no other part of Southern India produces similar ones. They are cheaper, last longer, stand rougher ware, and give more protection against sun and rain than cloth umbrellas, which are, however, fast displacing them, partly owing to the advantage of their being folded and partly to the fashion of the day. Cadjan fans are also largely used during the hot weather and they are very cheap. Cadjan leaves are also woven into rough mats,

Mats of North Travancore are made from the reed called 'Korai,' but only rough mats are so made. The leaves of the *Pandanus* are woven into very fine mats, which are prized highly for their smoothness.

The rattan work of Travancore is noted for its skilled workmanship. The Neduvangad hills yield very good canes, and the Koravars all along the base are great experts in rattan work. They make boxes, plates, baskets and other useful articles. Wurkalay (Janardhanom) and the surrounding places are famous for this kind of workmanship.

The abundance of material and the superior intelligence of the true Malabar population are two great factors in favour of our industries and it may, therefore, be safely predicted that a great future of industrial development and prosperity awaits Travancore before long.

STONE INDUSTRY IN CAMBAY.

By RAO BAHADUR MADHAVARAM HARNARAYAN VYAS,
Dewan of Cambay State, Cambay.

Like all ancient history, the early history of trade in Cambay is shrouded in darkness. But the references of foreign travellers in India allow us a few glimpses occasionally, by lifting the veil here and there. The earliest of such references takes us back to the tenth century, when Cambay trade was mostly in the hands of *Arab* and *Persian* Mahomedans, who were treated very kindly by the then Governor of the place who was a Hindu. It was then one of the chief centres of trade in Gujarat, and was famous for the sandal known after it. It maintained its position as such, through the eleventh century, when it served as a central market, for gathering and distributing various articles of both indigenous and foreign production. During this period, its trade extended as far as *Persia*, *Arabia*, and *Africa*, on the one side, and *China* on the other. The chief articles of merchandise included rice, honey, cotton, ginger, indigo, and manufactured leather articles. Its importance as a trade centre, seems to have grown with time, until in the thirteenth century, it came to be one of the two chief ports of India, notwithstanding the repeated checks it

received at the hands of the pirates that kept infesting the Gujarat Seas. It had developed a great trade in cotton, both raw and manufactured, indigo, and hides. A new element was added among the merchants of the period, *viz.*, the Parsees. The Solanki Kings of Anhilvad cherished all these classes of merchants, and Cambay seems to have reached the height of its glory in trade, during this century. No information is available as regards its trade, during the fourteenth century, but it appears to have added lac, silks, and paper to other articles of its trade in the fifteenth century. During this period perhaps in the apex of its glory, it had to turn its attention to the political activity of the period, when Gujarat had already passed into the hands of Mahomedan rulers. In the sixteenth century, the *Portuguese* appeared on the scene, and took away much of its sea-borne trade from the hands of the Cambay merchants. Though the control of foreign trade had changed hands, the trade itself did not suffer much. It remained in abeyance till the decline of the Portuguese power, when its trade with the *Red Sea* revived and almost regained its lost ground. Varied articles of merchandise came into its market, such as *vegetable* and *animal* products, manufactured articles, *minerals* including *precious metals*, perfumes and spices, for distribution, both inland and overland. The different kinds of *STONES*, the manufacture of which is the special subject of this paper, are first mentioned in this century as an important item in its trade. Reviving from its temporary check, its trade tried to spread its wings as far wide as before, and was even successful in its efforts, for a time. For about the close of the century a dangerous rival sprang up in the rise of Surat. The establishment of the *Dutch* and the *English* factories at Surat, dealt a blow to Cambay trade from which it has never yet been able to recover, notwithstanding that the two nations tried to do something for Cambay also. What the Portuguese failed to do, was permanently achieved by these two sister nations that came on the scene and Cambay lost its importance as an *Indian Port*, and began to dwindle only into local importance. The indigo trade had gone down. The native merchants began to fall into the background, until the staples of its trade were limited to *Carnelian*.

and *Agate* stones, grains, cotton, silk, and embroidery. In the eighteenth century, it became completely subordinate to Surat, though some of its products and manufactures were second to none of those of other Indian towns of note. But its trade was dwindling all the same, for its harbour had begun to fail it, and was becoming less and less suitable for large crafts. About the close of the century, its export trade was confined to *sall*, *tobacco*, and *carnelians*. During the nineteenth century, the trade of Cambay fell and it was reduced to the position of only a *Local Port* trading mainly with parts of Gujarat and Kathiawar, both by land and sea. What little remained to it of trade was diverted by the opening of the Railway, and at the present day, its staple industry consists of the manufacture of *carpets*, *sarrees*, *dhotees*, and *carnelians* and *agate articles*. But the ways of Providence are inscrutable. For the same Railway which once seemed to give the last death-blow to its trade, promises now to help its growth, and Cambay may hope to take its rank again as an important Indian Port, when the *natural* obstacles on the seaside are overcome by science and art skilfully applied. And remembering the Law of Alternation, the fallen may well hope to rise, and Cambay has a bright future before it, it being only a question of time and circumstances.

Having thus briefly seen the early history of its trade, we will now concentrate our attention on one of the chief articles of manufacture which came to it of old, and for which it stands almost alone, at least on this side of India. I mean the Cambay Stone Industry. Here we will see what these stones are, whence they come, through what processes they pass, into what articles they are manufactured, and where they go.

The term *Cambay Stone* includes different varieties of stones manufactured into different articles of use and ornament, in Cambay, and not stones found in the Cambay soil, as the term seems to suggest. All these stones come from different places, outside Cambay; chiefly from the *Rajpipla State*, *Morvi Villages*, *Ranpur* in *Ahmedabad*, *Kapadvanj* in *Kaira*, *Tadkeshwar* in the *Surat District*, *Chalisgaon*, and *Sarangpur*.

The chief of these is the *AGATE*, known from its fleshy colour as *Carnelian*. In the natural state, it is of a dull cloudy brown or yellow colour, and is known as *Ghar* ; and when worked it is called *Akik*. These Agate stones present a variety of colours and structures. Besides these there are miscellaneous stones of different kinds, coming to Cambay, for being worked up by its lapidaries.

The stone known as the *Agate* comes chiefly from the Rajpipla State in Gujarat. Obtained from a sandstone hill, some of the stones are known after it. They are dug up from the earth, the mines being worked most crudely. The stone is found lying in Carnelian clay, covered above with alternate layers of red and yellow ochre and fuller's earth. The mines are worked with the simplest of instruments. A small iron pickaxe, a few baskets, a rope, and a pulley on a frame, are all the equipment of the miner. It is estimated that two men, working from 8 to 10 hours a day, are able to take out from 10 to 40 pounds of stone, per day. The right of working these mines is put up to auction by the Rajpipla State, merchants from Baroda and Cambay going in for the contract.

The stones as taken out from the mines are of a mixed variety needing careful sifting. For some of these require a special preliminary treatment, called baking, by exposure to sun and fire. They are, therefore, divided into two classes, those requiring baking and those that do not. The object of *baking* the stones is to bring out the colours or differentiate them. For various colours are often found mixed up in the same piece. When these are subjected to the heat of the sun and of fire, the colours either brighten up, or become deepened or differentiated. It would, indeed, be a beautiful sight to watch these transformations as they occur, showing the workings of natural agents on such hard substances. But scientific intellect has yet to be applied to them in India, and it may be hoped that some future Bose may lay bare the pulsations of colour before an admiring audience, and give one more glimpse into the wonderful workings of *An All-Directing Intelligence*. But till then we should only note facts as they are. The stones that do not require baking are : (1) *Mora*, or *Bava Ghor*i, called Onyx ;

(2) *Cheshamdaror Dola*, called Cat's Eye; and (3) *Rori* or *Lasania*, called a kind of half clear yellow pebble. The first of these, *viz.*, the Bhava Ghorī or Onyx, is of two kinds; one being dark with white veins, the other being greyish white with dark veins. All except these require baking.

Baking consists in first submitting the stones to the heat of the sun, by spreading them out in open fields, generally in March and April. Then, in May, they are put into earthen pots, with a hole broken into their bottoms. These filled pots are then placed inverted into trenches about two feet deep. They are then covered up, all round, with sheep and cowdung cakes, to which fire is set. They are allowed to remain in this condition from sunset. In the morning, the stones are removed from the vessels, and are examined and sifted. The good ones are put into bags and sent to the merchants, for being worked upon. The changes of colour they have now undergone are worth noting. "Among the browns, the light shades brighten into white, and the dark deepen into chestnuts. Of yellows, maize gains a rosy tint, orange is intensified into red, and an intermediate shade of yellow becomes pinkish purple. Pebbles in which cloudy browns and yellow were at first mixed, are now marked by bands of white and red."

Carnelians of the best colour are generally of the red colour, which varies from the palest to the deepest blood red. Those that are deep red, and free from any cracks, veins or flaws, are considered to be the best. Next come the yellow and the variegated variety; while the white ones are very scarce.

Besides this variety which comes from *Ratanpore*, in the Rajpipla State, there are four other varieties known as (1) the Common Agate; (2) the Mcss; (3) the Kapadvanj Agate, and (4) the Veined. The first of these is of two kinds, Chashamdar or Dola, and Jamo; the Dola being a white half-clear stone, while the Jamo, a cloudy or streaked one. Though thus differing, the general colour which characterizes them is a greyish white. They come from near Mehidpur, in Morvi, Kathiawar. They are found in large blocks, varying in weight from five to sixty pounds; those of the greater weight being generally cracked, while

those that are smallest are almost perfect ones. This stone is very hard, brittle, and massive, and takes a very high polish.

The second variety is known as *Sua Bhaji*. This name seems to be a corruption of the word *Swabhavik*, meaning natural. For the stone presents variegated natural moss-like appearances, on a base of crystal. This variety comes from *Bul Kotra*, near Tankar, in Morvi. They are found in massive layers, about two feet below the surface, and are generally cracked. The weight of pieces of these stones as taken out varies from half a pound to forty pounds. When worked up they take a fine polish.

The third variety, the *Kapadvanj Stone*, comes, as its name implies, from near Kapadvanj in the Kaira District and is found in the bed of the river Majam. They are generally in the shape of balls, varying from half a pound to 10 pounds and being both spherical and spheroidal in form. They are picked up by the Bhils and sold to merchants. They present a great and beautiful variety of structure, presenting different natural landscapes and views in miniature. These stones also take a fine polish when worked up. They are known to merchants in three specific varieties called *Khariyu*, *Agiyu*, and *Ratadiyu*. The last, *viz.*, the Veined Agate, is the most valued of Cambay stones and is known as *Doradar*, from streaks or veins which are its speciality. They come from Ranpuri in Ahmedabad where they are found as small pebbles not excluding half a pound in weight. They occur in two chief varieties, having white streaks on a dark background and dark streaks on a light background.

We have now dealt with the chief varieties of *Cambay Stone*. But there are other kinds of the same of a miscellaneous character coming to Cambay for being worked. Some of these are indigenous to Gujarat and others are foreign ones, coming from *Madras*, *Ceylon*, *China*, *Bussora*, *Persia* and *Bukhara*. Some of those are only artificial products of various composition. The indigenous ones come from *Tankar* in *Morvi* or thereabouts. The chief of them are the *Lila*, *Chantdar* or *Patolia*, varieties of *Fasper*; *Ralia* or *Chocolate Stone*, *Maimariam*, a liver brown marble with

yellowish marks of shells and animalculæ; and *Phatak* or *Cambay Crystal*, a variety of this *Phatak Stone*, comes from Madras, Ceylon and China. Of the foreign stones *Rajan-arkh*, *Lapis lazul* or *Azure Stone*, of a deep blue besprinkled with silvery golden grains or spots, is very beautiful. It comes from Persia and Bukhara and derived from river beds and banks. *Kala Rathad* or *Black Stone* comes from Bussara and Aden, but is now not generally imported. The blue stone, another variety of foreign stone, is not the true Piroja, but an artificial product like glass, capable of taking fine polish.

These are almost all the varieties of stones worked in Cambay, by its lapideries. We will now see how these stones are manufactured into different kinds of finished articles.

There are three main *processes of manufacture*, through which all articles have to pass before they are ready for the market. Some articles require to go through two or three additional processes. The three main processes are those of *sawing*, *chiselling* and *polishing*. The instruments used in these processes are of the most elementary and primitive type, and continue to be so up to now. The materials used are also mostly prepared by the workmen themselves, requiring thus very little outside help.

The process of *sawing* requires a toothless iron plate, serving as a saw, a suitable wooden frame to hold the stone in position, and a quantity of ground emery, fine sand, and water. The stone to be sawn is placed on the horizontal bar between the two uprights of the wooden frame, and fixed there with a special cement, made of coarse bee's wax and cotton fibres. According to the size of the stone, the saw is worked by one or two men. While it cuts the stone, the mixture of ground emery, sand and water is kept dropping upon the split parts of the stone, for smoothing the faces that are freshly cut. The stones are thus sawn into different shapes as required, and then pass on to other workmen, for being chiselled.

This process of *chiselling* requires an equally small number of instruments, which are of a very simple type. A slanting iron spike and a horn-headed hammer are all the

instruments needed. The spike is driven into the ground deep enough to leave only its head above the ground. The stone to be chiselled is then placed in different positions near it, so that the part to be removed just touches the protruding spike head. A quick and guarded stroke with horn-headed hammer does the rest. The stone is repeatedly treated thus until all its irregularities and roughnesses are removed. This completes the process of chiselling. It then passes on to the polisher.

The polisher or *ghasia* as he is called, requires instruments equally simple. It is a wooden frame with a revolving cylinder, carrying the polishing plate, a set of bows, and a pot of water. The polishing platters are generally made of a composition made up of ground emery or karanj, and lac, in proportions varying from one to three parts of emery to one of lac, according to the hardness of the stone to be polished. Very hard stones defy the action of these plates, and hence require discs of copper instead; while those that are not sufficiently hard to withstand the friction of the lac-emery plates require hard-grained wooden plates to polish them. The string of the bow is wound several times round the wooden roller, carrying the polishing plate. The polisher takes hold of the bow with the right hand, and with the left holds the stone to be polished, in close contact with the plate. The stone is generally held between the fingers wrapped with scraps of cotton cloth steeped in water, and kept wet by dipping in it. By drawing the bow to and fro, the plate revolves and polishes the stone.

Besides these, some stones require to go through special processes, without which they remain unfinished. For this purpose they have to be sent to *Dholias* and *Patimars*, and sometimes to *Vindhars*. Beads both plain and cut-faced, knife-handles, and other articles of a similar nature, necessarily require to go through these processes. The *Dholias* and *Patimars* rub them against suitable surfaces, the former using a coarse and hard smoothing-stone, while the latter only a wooden polishing bead. They are also put up in leather bags, mixed with emery and carnelian dust, and are subjected to constant rolling by two men sitting on either side of the bag, who pull it alternately,

keeping the bag moist all the time. This bag-rubbing continues for about a fortnight. Then comes the *vindhar*, or driller, who drills the prepared articles, by means of diamond tipped steel drills of various dimensions. Drilling is also used in hollowing, as in making cups, and in making other shapes of a similar nature. The stones are first drilled in different places to the required depth, and at required intervals, and then the projections so formed are carefully struck off. The hollows so formed are then smoothed and polished, where necessary, by using required shapes of polishing plated composition, on the polishing wheel, instead of simple discs.

The *articles* so prepared are of great variety. They are studs, sleeve-links, flat, oblong, circular, semi-circular, and oval, various kinds of pieces for head ornaments, ear-pendants, watch-chains and charms, amulets of various designs, bracelets, armlets, wristlets, seals, watch seals, necklaces, slabs large and small, for boxes; rosaries of circular, cut or diamond-cut beads; paper-weights; paper-cutters; steel-holders; inkpots; knife-handles, cigarette-pipes, rulers, seals, flower-vases, cups and saucers, chessmen, shivalingas, with or without base, and many others like cannon with carriage and trappings.

The manufacture is limited by the size of the stone available. These articles were formerly prepared with a special eye to the demand in the *Chinese*, the *Arabian*, the *Persian*, and the *European* markets, where they were in great demand. China consumed a large number of beads, and other articles of ornament. Amulets and such other articles were much in demand in Persia and Arabia, while articles of fashion and table ornaments were consumed in the European markets. In the days of her glory, Cambay traded directly with these markets, but now the course of her trade has entirely changed, and it has direct dealings with only a few places outside India except through Persian and Arabian horse merchants that happen to visit Cambay. Most of her present trade in these markets, excepting China, is carried on through merchants in Bombay, who serve as middlemen between merchants in Cambay and those in foreign markets.

This trade and industry which once formed one of the STAPLES of Cambay manufactures, continues still to be so, though it has relatively diminished in proportion. It was once so important that every line of this trade had its own guild, headed by the *Akikias* or merchants who got these stones worked. But these guilds no longer exist, and the industry is open to all who may choose to take it up. This industry supports about 2,300 men, about 1/16th of the total population of Cambay. Formerly in the hands of the Mahomedans, it is now appropriated as a regular profession by the *Kunbis*, who employ other classes such as Ghanchis, Golas, Pinjaras, Rajputs, Ravlaias, and Mahomedans as paid workmen. Of these 1,000 are Ghasias, 200 Vindhars, 250 Dolias, 40 Patimars, and the remaining are all Khandias, that is shapers, of whom about 200 are skilled and the rest, unskilled. Each line of this trade is worked separately, but there are about seven merchants at whose factories two or more of these lines are worked side by side. But the spirit of cooperation is lacking, and the general ignorance prevailing among them tells against the development of this industry, though it is full of promise. For it is calculated that raw stones of the value of Rs. 1,000 are capable of being manufactured into different articles of the total value of Rs. 1,00,000, *i.e.*, raw stone after being worked acquires one hundred times its original value, and this with the crude methods and primitive instruments now in use. The total value of raw stones, annually imported is estimated at about 3 to 5 thousands and the total value of articles annually sold at about a lakh and a half to two lakhs.

It has been seen that the Cambay Stone Industry is an industry of a very long standing, but that like all things in this world, it had its days of youth, and is now in its old age. Various causes have contributed to the rise and fall of this industry. But the most important one seems to be, as everywhere else, the extreme conservatism of those engaged in it as regards the methods and instruments used, these continuing to-day to be the same that they were in the 17th century, when the industry first appeared as an important item in Cambay trade. But it is hoped that as a result of a greater touch with the *Universal Enlightener*, I mean *Educa-*

lion, the people will be able to revive this ancient industry and to make a stand against new rivals, if not to compete with them.

PURCHASE OF GOVERNMENT STORES.

By G. B. PHANSALKAR, Esq., *Pleader, Satara.*

What is it, at present, that necessarily forces itself on the attention of even a casual observer of things in India ? There cannot be two answers to this question. It is Swadeshism. The mind of the Indian world has but one engagement and it is the improvement of the Indian arts and industries. The idea of Swadeshism is the ruling passion of the day whether with the young or the old ; Government or the people. It is Swadeshism that will be found discussed in newspapers or on platforms. However divided the views in the different political parties in India, it will be found that the common bond of union amongst them is Swadeshism. By whatsoever a name the pith of the doctrines of Swadeshism may be expressed, say, whether by boycott or regeneration of the arts or industries of India, or honest Swadeshism, it is Swadeshism that is on the anvil in clubs, shops or mass meetings. The talk of people in the streets or their homes at leisure hours, is nothing but that such and such a person made or did not make, or should or should not have made purchases of Swadeshi goods. The merchants—European and Indian—dealing in foreign goods, whether wholesale or piecemeal, will be found anxiously enquiring and finding to their surprise and disappointment that the general customer is fast running from foreign-made to country-made articles of daily use. In fact, at present, the merchant, the trader, the platform speaker, the newspaper editor, and the idle talker have no other subject of engagement than that of Swadeshi ; and at such a time, pardon me if I encroach upon your time by asking your attention to how the Government of India purchases the large and varied stores it usually requires.

Generally, such enquiries are made when one has to ascertain whether A or B is *de facto* pro-Swadeshi or only a lip-sympathiser, but the present enquiry is not to be carried on only with a view to ascertain whether the Government is

a friend or foe of the Swadeshi cause but also with a view to bring to the notice of the public at large the all-pervading customer in Government who, if inclined to buy Swadeshi goods, can buy much more than all of us put together or foster by direct encouragement the Indian arts and industries more than we all can do. To the political student it will give materials to draw his own conclusions as to the drain this item of expenditure alone entails on the revenues of India ; to the industrial worker it will supply information regarding the material help Government can afford, if it is so inclined, and to the social reformer the study will repay his trouble and time by knowing how race and class prejudices dominate, in spite of professions to the contrary, the Western Government in the selection of articles and make him hesitate for a time in his profuse abuse of the class and race distinctions we people now ask our brethren to observe in their choice in the market of country-made articles. To a section of the short-sighted social reformers Swadeshim appears to be a big humbug, as according to them appearance and price are all that are to be looked to and not the country where the particular goods are made ; because their sympathies enlarge and extend to the whole world. To give you a rough idea of the vastness of Government purchases, allow me to state that the Stores Department makes annually purchases of from 6 to 7 crores of rupees worth of goods in England and of about 70 lakhs worth in India ; and the list of articles is so varied and comprehensive that it includes all possible articles both of necessity and luxury for the people of England who condescend to come here to enjoy the riches of India at the expense of the poor Indian ryot. I would ask you to imagine rather than venture to state the variety and number of articles that the Government of India requires ; a Government which has a large army among other departments, of fashionable English soldiers to be best fed, lovingly reared up, and luxuriously amused, of the numerical strength of 80 thousand people of all ranks. They require electric fans, bikes, motors, clothing of the best fashion and cut. You will, therefore, agree with me in thinking that this part of the subject can be better imagined than stated.

Up to the year 1860, every article, whether it be a pencil or a piece of blotting paper, of however little value, had to be bought in England and England alone and through the agency of the Stores Department, and this practice was enforced by a set of rules that prohibited any purchases in India whether the article be manufactured in or imported into India; and the Stores Department like a jealous and domineering wife watched and chastised any departure from the practice by an officer of however high standing. Such a state of things was undesirable in the official world itself, from various points of view. The urgency with which articles were required, the needs of the public service the cumbrous procedure by which the articles were supplied by the Stores Department and the time and energy spent before a pencil could be got by a Collector, or, for the matter of that a Governor, all induced an officer to secure a relaxation of those rules. It also happened that articles which were supplied did not often answer the requirements either through misdescription by the indenting officer or misconception on the part of the supplying agency. All these causes combined to facilitate repeated departures by the subordinate officials. Again, before the year 1860 English merchants in India were few. But by this time, when the Government was firmly and widely established, a number of firms had planted themselves on the Indian soil. The inducements to the English capitalists and merchants were not few. It was known by this time all over the European world that India was a country where labour was especially cheap. The old industries were completely demolished by the somewhat short-sighted policy of the East India Company and its servants who were not only administrators but merchants of the worst type. The steady and consistent policy of demolition was carried on in a number of ways, and forms by itself a sorrowful tale which is best told by Mr. Romesh Chunder Dutt, and does not form a proper subject of this paper. Be it understood that many English or European firms were established by this time to work either as manufacturers or dealers in manufactured articles. They formed themselves into Chambers of Commerce and

assumed an importance and influence which they could bring to bear on the responsible officers of the Government of India.

I must at this point carry you a little into the machinery by which the Government of India procures for its use the many necessary articles. As already stated the Government of India is the highest and biggest body, it requires the largest and most varied number of articles and so it is the biggest customer in the land. These firms as said above, by their influence induced the Government of India and its officers to become their customers and the Government of India was induced to make small purchases. The rules and policy of the Secretary of State for India, however, prohibited purchases otherwise than through its own department, *viz.*, the Stores Department. This takes me to the constitution of this Department. The Stores Department is thus organised. The chief officer of this Department is called the Director-General of Stores, and has a staff for the purchase of stores, for the engagement of freight, and general correspondence, and has rooms in the India Office. There is a Superintendent with a staff for examining and taking charge of and shipping the stores. There is another branch of this Department called the Ordnance Department whose duty it is to provide, store, issue, and account for all equipments, accoutrements and munitions of war required for the use of the whole army in India including the Imperial Service Troops of the Native States and military police and regular police in India. It has also to look to the upkeep and supply of ammunitions for the several armaments on the coast and frontier defences, and also to the supply of munitions of war for the Indian Marine and the maintenance of certain reserves of ships of the Royal Navy on the East Indian Station, and for fitting out armed merchant steamers in time of war. This Department though headed by the Military Member of Council or as now called the Supply Member, is after all a branch of the Stores Department. These two branches of the Stores Department between themselves not only make purchases for the Military Department but they make purchases for all the departments of the Government of India such as Railway,

Telegraph, Post, Police, Education, Stamps and so forth. The Stores Department independently of purchases made by it, costs annually, independently of the charges included in the "General Administration charges" for general supervision, a sum of not less than four lakhs of rupees to say the least, and is one of the heavy drains on the resources of the Indian Government. But it would be digression to refer to this account and I leave it with the simple remark that it is such a heavy drain that the Government of India has often protested against it and it has afforded them grounds to push forward the policy of making purchases in India in preference to purchases through the Stores Department.

This practice was in vogue for a long time but no stores of any considerable value were purchased ; and the officers of the Government of India were shrewd enough to make such purchases slowly and always under the plea of urgency or necessity so as to avoid inconvenience to the public service. Thus slowly initiated, the practice assumed dimensions by 1862 such as to attract the notice of the then Secretary of State for India in Council, Sir Charles Wood.

He would not countenance a departure from the rules that required that all purchases should be made through the Stores Department. He, therefore, in his dispatch, No. 218, dated 27th December 1862, addressed to the Government of India, requested that the growing practice of obtaining stores of English manufacture otherwise than through the Stores Department might be checked. This is the first dispatch of its kind which laid the foundation of a strife between the Government of India and the Secretary of State for India in regard to the policy since then constantly and consistently pursued by the Government of India, of encouraging industries in India. Thereafter, long correspondence ensued between the Government of India and the Secretary of State and the *pros* and *cons* of the policy were put forth by either side for about 10 years, till say 1870. In the year 1871 another change in the powers, constitution and reciprocal relations between the Supreme Government and the Provincial Governments was initiated. This change though apparently foreign to the subject, had an amount of influence on the subject in hand, nay it served as the main

reason for inaugurating avowedly the policy of the Government of India of encouraging the local industries. The system under which the Government of India now transfers to the Local Governments the responsibility of collecting and the right of spending a large proportion of its own revenues was first inaugurated by Lord Mayo's Government in 1871. Before that time the Government of India had exercised sole control over the entire Imperial Revenues, and had been alone liable for all the demands that could be made thereon. The Local Governments with the exception of Bombay, which raised a considerable revenue for local purposes, had to appeal to the Government of India for the means wherewith to satisfy any local needs that might arise and had for their guidance an authoritative ruling as to the limits within which the expenditure on each department in each province had to be kept and each one asked for sums that it thought might be expended on the improvement of the administration. The Government of India, on the other hand, being not in a position to fully understand local requirements and not having the knowledge necessary for the successful development of local resources, had to apportion its resources as best it might to meet the demands of the Local Governments.

Lord Mayo's Government, therefore, determined in order to remove the necessity for the annual grant by the Government of India of an assignment for each department of administration in each Province, to hand over to the Local Government the financial responsibility for those services in the discharge of which they were especially concerned and the expenses of which they were especially liable to incur. With this object in view it entrusted to each Local Government the responsibility of meeting, from a fixed permanent grant, the expenses of the services included under the heads of Jails, Registration, Police, Education. Thus was inaugurated the system known as the Provincial Contracts, which obtains till now. When this change came on in the relations of the Provincial Governments with the Government of India, the strife in favour of local purchases had not ended and with a view to settle the dispute, or difference for the matter of that, a special committee was appointed in the year

1876. This committee expressed the opinion that the Government of India and Local Governments and Administrations might in future be allowed to exercise their discretion as to the agency through which supplies of all sorts might be obtained subject to certain exceptions and conditions as to payment and inspection.

The objects the Committee had in view were—

(1) The reduction of the payments for stores in England.

(2) The encouragement of Indian manufactures and of a system of local agency for supplies not of Indian origin.

The Committee urged that as the responsibility of meeting certain expenses from the fixed contract grant was thrown on and accepted by the Local Governments it was desirable to do all that was reasonable to enable them to effect the strictest economy; and thus enable them to satisfy such demands as they might think fit to provide for. The former rules strictly enforcing resort to the Stores Department for the necessary supplies were relaxed; and the growing practice which had attracted the notice of Sir Charles Wood, who tried at the instance of the Stores Department to check it, was not only not checked but was encouraged and became practically the policy of the Government of India. Local Governments thus secured the discretion to themselves to make their choice as to the agency through which to make purchases. Certain exceptions were made as to which it was ruled that they were to be invariably obtained through the Stores Department. These exceptions related to (1) Railway, Engineering and Telegraph plant and materials; (2) Malt Liquor; (3) Clothing for European troops; (4) Military supplies; and (5) generally, any stores of a special character of which large stocks were required.

These recommendations were approved by the Secretary of State, the Marquis of Salisbury, and in his dispatch No. 477 dated the 7th December 1876, he desired the Government of India to issue orders accordingly. It took the Government of Lord Northbrook full two years to frame rules in accordance with the recommendations of the committee and the first set of rules recognising the encouragement of local

industries as one of the guiding principles of the policy of the administration was issued. These rules divided the subject into two divisions.

A. Stores to be obtained through the India Office :—

- (1) Special machinery and appliances.
- (2) Railway, Telegraph and Engineering plant and materials.
- (3) Malt Liquor.
- (4) Clothing materials for European troops.
- (5) Military stores of a special character.
- (6) Marine.
- (7) Writing paper, loan and water-mark paper.
- (8) Stamps.
- (9) Medicines (but with liberty to Local Governments to buy such medicines as are to be paid for from Provincial Funds).

B. Stores to be obtained by Local purchase or direct from Europe or America through manufacturers or through private agents :—

- (1) Books, newspapers and periodicals.
- (2) Type and printing materials.
- (3) Stationery other than writing paper.
- (4) All other civil stores.

These orders were submitted to the Secretary of State for India in Council for approval. Fortunately the reins of the Government were then in the sympathetic hands of the Marquis of Salisbury, who not only approved of those rules but said that he noted the substitution of Bally Mills for European paper as satisfactory. The Secretary of State also urged the desirability of more such substitutions even at some temporary increase of cost.

In the year 1880 on the 4th August the Secretary of State, Lord Hartington, a Liberal, made a further addition. He eliminated Railway plant and materials from the subdivision A and put them in B, *i.e.*, among those that should be procured in India. This was a decided step in advance. Many European firms were by this time established who manufactured railway plant and materials of similar quality but they were not included in Government purchases. These were certainly hard lines as the administration not

only excluded Indians from having any share in the Government administrative machinery but their productions were to share the same fate; but thanks to the Government of India who carried on a strenuous struggle, of course, in the interests of economy a passport was secured to Indian manufactures. This addition to the list B of Railway plant and materials was an unpleasant thing to the Stores Department, who as was natural, were bent on advancing the interests of their own department. There is another view of this attitude. It is believed by some that the Stores Department was only a mouth-piece of those big English firms who had enjoyed a monopoly of dealing with the Stores Department, and it must be they who must have made the Stores Department their instrument to fatten themselves. Be it what it may, certain it is that one officer of the Government of India within only four months of the last addition, the addition of Railway plant and materials, raised a storm of opposition against this addition. It was General Hyde, then Inspecting Engineer of State Railways, who made a report on the 27th January 1880 stating all objections he could against the policy promulgated as recently as the 4th August 1879. He urged that railway plant and materials could only be usefully purchased through the Stores Department at home, first because railways having to carry passengers dealt with human beings and the utmost safety must be ensured, and that safety and reliance could only be secured by purchasing the articles manufactured in England. Secondly, many of those articles were not a part of the general trade of the country, there was less competition in India amongst manufacturers, and thus if they were bought in India, proper articles would not be forthcoming. Thirdly, he urged that many of such articles required inspection during the manufacturing process and the Government of India being not possessed of a scientific staff to inspect the processes, the articles would be bought without proper security. Fourthly, he said that while the Government of India was bent on effecting economy in expenditure they would be running counter to their policy as they would have to pay more for such articles in India. Thus was a howl raised against the policy of encouraging industries in India. Within four days from this

date, *i.e.*, on the 31st January 1880, the Director-General of the Stores Department took up the report and backed it with all his might. What strikes me as it would strike anybody, is the expedition and haste manifested here. While it took these officers fully 24 years to appoint a committee and three years to pass orders according to the recommendations of this committee; the Stores Department did not require as many months, nay days, even to receive, digest, and uphold the objection report of General Hyde, the Inspecting Engineer for the State Railways. So, within four days of his report General Hyde found a supporter in the Stores Department; and one would not be far wrong if one were to guess that this might have been the result of a pre-concerted plan. Whatever it may be it is, indeed, a unique coincidence; and I leave it with this remark alone.

General Hyde had, fortunately for India, a strong opponent in the Financial Secretary of the Government of India, Sir R. B. Chapman, who took the brief for the Government of India, then headed by Lord Ripon, whose name has become popular for various other reforms and whose work in India can never be forgotten by the Indians. I must, before I pass on to the efforts of Sir R. Chapman, place before you what the Director-General did as soon as the complaint of General Hyde was brought forward. He not only supported General Hyde but proposed to re-open the whole question with a view to the restriction of local purchase actually to those articles produced in India or found in the general trade of India, mark, gentlemen, *of quality and price comparing favourably with the purchases through the Stores Department.* You must not have forgotten that the Committee of 1876 and the latter resolution of the Government of India while trying to encourage the Indian industries "urged the desirability of purchasing in Indian markets even at some temporary increase of cost." The Director-General wished to undo this recommendation and said: "of quality and price comparing favourably with the purchases through the Stores Department." Thus you will at once see with what jealousy the Stores Department viewed the recent orders. Now to go to Sir R. B. Chapman, he met all the arguments of General Hyde and proved that expert

opinion was at his back when he said that the railway plant and materials produced in India were not in point of quality inferior to those obtained through the Stores Department. He urged that *true* economy required the encouragement of manufactures in India at some greater cost in the beginning and that the initial increase would in course of time be more than repaid. He said that whenever new industries had to be established in any country the initiation was always attended with greater expense but that the principles of political economy taught that such initial apparent increase in prices was more than repaid in course of time. He urged that this point of greater price was not one that was not noticed by the Committee of 1876, and that they expressly desired such greater cost to be incurred. He also brought to their notice the rather indecent haste with which the question had been re-opened. Unless a reasonable time had elapsed and a reasonable trial given to native manufactures, it would be utterly impolitic, he said, to reverse a policy which had hardly a half year for trial and experience. Thus he disposed of the arguments of General Hyde. There was yet one insuperable argument of General Hyde's, *viz.*, that some railway plant and materials required inspection during the course of manufacturing and that the Government of India did not possess a scientific and expert staff to undertake this work. Sir R. B. Chapman had to yield here; he had to admit that the Indian Government was not so equipped, and had also to say that the Government of India could not provide such a staff because the articles produced in India and required in India would be few and the provision of such a staff would entail expenditure beyond proper limits. However, he said that this difficulty, insuperable though it was, does not apply to a large number of articles which are wanted under the name of railway plant and materials. He, therefore, urged the necessity of separating such articles as required inspection during the process of manufacturing from those that did not require it. After examination he found that there were certain articles, indeed, that required inspection and conceded that they might be ordered to be purchased through the Stores Department. There were yet many that could be purchased here. He,

therefore, recommended a modification of former rules to this extent, that stores that needed inspection during manufacture should invariably be obtained through the Stores Department and stores that were not procurable in India should also be indented for from the Stores Department.

This view of the Financial Secretary met the wishes of the Secretary of State for India in Council who requested the Government of India to issue orders directing that when stores were of such a nature that they had to be purchased in England, there should be no departure from the system of forwarding an indent on the Stores Department, and that the purchase of such special stores as Railway plant and material be limited to articles usually procurable in the local market and be not extended to purchases in England either directly or through agents. The Government of India were again requested to announce their desire to give the *utmost encouragement* consistent with true economy to the supply of articles by the Local Market.

The Government of India issued orders carrying out the wishes of the Secretary of State in Council in their Resolution, No. 366, dated 3rd November 1880 and again in more detail in Resolution dated 10th January 1883, No. 48 of 1883 (Finance and Commerce Department). The orders were approved by the Secretary of State in Council (No. 88 of 16th April 1883); and are practically now in force. These are as follows :—

PUBLIC WORKS DEPARTMENT CODE, VOLUME II,

Appendix 30.

“ Rules for the Supply of Stores for the Public Service of India.

“ All articles required for the Public Service *which are not manufactured* in India should be obtained by indent upon the Stores Department of the India Office except in the following cases :—

“(a) When for any special reason it may be more economical to purchase them in India.

“(b) When serious inconvenience to the public service would be caused by waiting to obtain them from England.

“(c) When the articles are perishable.

"(d) When the value of any one article, or any number of articles of the same description, does not exceed Rs. 50.

"(e) Explosives; which should always be purchased locally as required.

"(f) Plant and materials for installation of electric light or fans in Government buildings.

"(g) Plant required for the interlocking of signals on State Railways.

"*Note.*—When Public Works Department Officers carry out works for Municipalities, Cantonment funds, or other corporate bodies, the procedure laid down in this appendix for the purchase of stores of European manufacture should be followed, unless the sanction of the Government of India is obtained to a departure herefrom.

"2. The previous sanction of the Government of India, or the local Government, as the case may be, must be obtained to the purchase of articles in the local markets under the clauses (a), (b), (c), (f) and (g), of Rule 1, and the reasons which make it desirable to purchase locally in such cases must always be placed on record. Managers of open lines of State railways may sanction purchases of articles in the local market under clauses (a), (b) and (c) of rule 1 up to a limit of Rs. 500 for any one article or of any number of articles of one and the same description, provided the reasons for the purchase and sanction thereto are recorded in the minutes of the official meetings.

"Petty purchases under clause (d) may be made locally by officers authorised to incur expenditure without the previous sanction of Government, provided they do not include such articles as should under para. 728 of the Code, Volume I, be obtained by indent upon the Superintendent of Stationery.

"*Note.*—Nothing in these rules is to be deemed to prohibit the purchase of Stores of European manufactures by one Department of Railway for another.

"3. The purchase of English stores by means of orders given to agents or firms in India, who have to transmit such orders to England for execution is prohibited; and no articles may be purchased from England except through the agency of the India Office.

" *Note.*—Books and newspapers are exempted from the operation of these rules, their purchase being subject to the rules in appendix 7 of this code.

" 4. All articles required for the Public Service which are manufactured in India from materials produced in the country may be purchased locally.

" Those manufactured from imported materials may be purchased in the local market subject to the following conditions.

" (a) That they be comprised in the list of Schedule A of these rules.

" (b) That the articles shall not have been imported into India in a finished or partly finished state.

" (c) That the price of the articles be not in excess of that at which similar articles of equal quality could be obtained by indent upon the Secretary of State, the cost of carriage to site being taken into account in each case.

" (d) That all important iron and steel work shall be subject to the specification in Schedule C and pass the tests therein prescribed.

" (e) That the purchase of articles under clause (d) above be made only from those firms who after satisfying the Government of India that they are capable of supplying work in accordance with the specification in Schedule C and that they possess the plant necessary to carry out the tests in it, have their names entered on the list in Schedule B, this list being subject to revision from time to time.

" Articles on the list in Schedule A to which it is not necessary to apply the test prescribed in Schedule C may be purchased from any *bona fide* manufacturing firms who may be approved by Superintending Engineers under Local Governments or Administrations, or by Managers or Engineers-in-Chief of Railways as the case may be.

" 11. Stores indented for Provincial as well as for Imperial services may be included in the same indent; but in such cases the only fund heading to be entered must be "provincial," subsequent adjustments being made in India.

" 12. Indenting officers are responsible that the Store lists of neighbouring Administrations and Railways have been

as far as possible searched and that none of the items entered can be advantageously procured from such sources.

"13. If any indent on England contains items which it is possible to obtain of Indian manufacture or of indigenous origin, it should be distinctly explained on the face of the indent in the column of remarks why such articles have been indented for from England instead of having been procured in India; otherwise, they will be liable to be cancelled.

"14. Each article must carry a certificate of the necessity for the stores indented for, and that they cannot be advantageously procured of local manufacture, or from surplus stores of other Departments, Railways and other Administrations.

" ANNUAL RETURN OF EXPENDITURE ON STORES.

"24. A statement of the expenditure incurred on the purchase of stores during the previous year should be prepared by each Examiner of Accounts and forwarded through the proper channel so as to reach the Government of India not later than the 31st of August of each year."

With regard to the encouragement of local industry, the resolution, para. 28, impressed on the local Governments the desirability of substituting articles of *bonā fide* local manufacture for similar articles obtained from Europe, adding that, when articles of European and Indian manufacture did not differ materially in *price* and *quality* preference should be given to the latter, *i.e.*, of Indian manufacture. This was held to apply to articles worked up in India from imported material. And finally it was pointed out that there were many articles which might not be immediately obtained in the local market but which could be made in the event of the Government encouraging the manufacture. Thus ended a strife between the Government of India and the Stores Department with a certain and positive success for the former and thus Indian manufactures secured to themselves an entrance in the Government Departments.

The same questions were again on the anvil though in a different form. The question was once more opened in 1885 by the Indian Finance Committee with regard to local purchase of imported stores. The then Government of India

unlike its predecessor, urged at this time that such articles should be invariably imported from the Stores Department because it was its experience that such articles could be obtained at a cheaper price when obtained through the Stores Department than when procured in the local market ; but it said that it had recourse to the local market owing to the delay experienced in obtaining these articles from the Stores Department due to the somewhat cumbrous procedure of the Stores Department. The Secretary of State admitted the delay and asked the Stores Department to make the necessary change with a view to avoid the delay, which the Stores Department said they had made, and thus the question was set at rest leaving the rules practically unmodified and unchanged.

In the year 1888 the Government of India took a further step in the direction of encouragement to local industries in a somewhat different way.

Without previously obtaining the permission of the Secretary of State the Government of India stated that they had sanctioned as a tentative measure, the local purchase of iron and steel for the Ordnance Department and asked the Secretary of State that the continuance of this arrangement might be approved. The Secretary of State, however, refused sanction, only saying in his reply that no such thing could be allowed.

The Government of India was not discouraged by this defeat and in the year 1889 forwarded its correspondence with Messrs. Richardson and Cruddas of Bombay suggesting that the rules might be relaxed still more and that bridge works, tools and plant made of steel imported from Europe might be classed in the list B so that they might be locally obtained. At this time the Government of India carried on the battle in the name of Messrs. Richardson and Cruddas. It is through the mouths of these gentlemen that the Government of India urged all arguments in favour of their view. To whomsoever you may give the credit of pushing Swadeshi at this time the battle was won by the Government of India, and since then, in accordance with the resolution of the State Secretary, No. 260 of 1891, dated 25th June, girders and hinges have begun to be manufactured and purchased by the

Government of India. Among the various arguments urged by the Government of India there was one which showed the true state of the mind of the Government of India, then headed by the Marquis of Lansdowne. But at this time they said that as they were imparting technical education under the orders of the State Secretary, they were bound to provide a field for the employment of such educated men and unless Government encouraged, nay initiated, such industries they were not expected to come into existence in such a country as India where labour was cheap and capital *nil*.

Now to touch in passing one more point, it is not only for the Civil works that the Government of India waged its war with the State Secretary; but the same spirit, the same tone and the same labour have secured to India many Government factories where arms and ammunition are prepared. The aim in starting these factories and arsenals is to make India independent of England for the purpose of procuring all arms and ammunition. You will find that at present there are 11 arsenals in India and nine factories. In both these kinds of manufactories, arms, ammunition, gun powder, harness and saddlery and other requirements of the Ordnance Department are manufactured. The arrangements are not yet completed but the ultimate aim of these manufactories is to supply the Indian Government with all the requirements of the army and navy. These manufactories are in every sense Swadeshi manufactories. The capital is supplied by the Indian revenues, the labour is practically all Indian except the supervising staff, and the material is mostly Indian. In fact, labour, capital and material are all Indian, and thanks are due to the Government of India that they have initiated the industries by themselves and on their own account.

For about 15 years since the last orders in 1891 the subject of purchasing Government Stores was a dead thing except for some trivial alterations in the list of articles under class B or the list of firms from whom the purchases in India were to be made. But there is one Resolution of last year which I cannot pass unnoticed. I here quote such portion of it as I think relevant to the subject in hand.

It is No. 6141 under date 19th October 1906 and says:—

"Letter from Messrs. Godrej and Boyce's Manufacturing Company, dated 3rd August 1906 ; stating that they are the manufacturers of safes and locks, pointing out that Messrs. Harichand Mancharam & Son, who are also safe manufacturers have made exaggerated statements in their catalogue to the effect that they have been declared to be the best safe manufacturers in India and that Government have passed a resolution that safes for public use should only be purchased from them ; prays for an enquiry into the truth of the representation in the catalogue of Messrs. Harichand Mancharam & Son.

" *Resolution* :—Under the Government's Resolution noted in the margin the names of certain manufacturers of iron safes were communicated to all Heads of Offices. The object of those orders was to inform Government offices that good country-made safes be purchased in India. Many years have elapsed since these orders were passed and the list approved in 1883 is manifestly obsolete. It is considered undesirable to authorise any further additions to the list and in the circumstances the Government Resolutions referred to are hereby cancelled."

The resolution speaks for itself. It shows how the European firms are vigilant and how successfully they can push their interests and put down in the Government markets the native firms. The effect of the above quoted resolution is to give a successful fatal blow to the firm of Messrs. Harichand Mancharam & Son, as regards purchases of safes and to require the Government offices to purchase them from any firm but practically from European firms. I do not think any more words are necessary as regards this attitude both of the European firms and the Government. Except this resolution there has been a lull only recently broken by the Resolution, No. 1243-52, dated 17th February 1906 appointing a committee of Mr. W. Macdonald and others to inquire into and make proposals for enlarging spaciouly the list of articles which should be bought in India whether manufactured or imported owing to a change of circumstances and the fact that many new and sound firms of manufacturing capacity have been coming into existence in India every year. It is no use anticipating the

reforms that may be proposed and adopted by Government and approved by the Stores Department and, it is only right to await their recommendations. This committee long ago submitted their report and as far as a casual newspaper reader can see, nothing more than the appointment of their committee has reached the public. Nearly two years ago from the materials available then, I wrote and read a paper before a Poona meeting showing that the Swadeshi cause was first taken up by the Government of India and though I still cling to the view I am sorry I have to modify the hope then expressed that it will be fostered by the Government of India in view of its recent constructive and destructive attitude towards the Swadeshi cause.

As this is not the proper place for the discussion of this view I do not refer to it at any length.

TECHNOLOGICAL COLLEGE FOR INDIA.

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In this paper I propose to give a scheme for a technical institution which we so badly need in this country not only to earn our livelihood but for the general well-being and prosperity of the whole nation. The necessity of such institutions has been publicly demonstrated more than once by the weighty utterances of qualified men of the day ; and I believe most of the readers of this paper realise it more than the scope of this paper allows me to write here. I shall, therefore, briefly indicate the present backward condition of India, and contrast it with the progress made in other countries, the example of which we may profitably follow. I shall then proceed to discuss the branches of technology, instruction in which is most urgently needed in the present condition of India. I shall next outline a scheme for the establishment of the same. The paper will end with a list of industries which can be taught in the institution.

Let me first define what is meant by technical education

Technical Education distinguished from education in science
 cation defined. and art. Science is systematized knowledge,
 art is the practical display of science. Technical education

is training in the application of science to anything, but by convention, application to the useful arts and manufacture. The object of technical education, therefore, is to provide instruction in applied science in all its ramifications to qualify students to turn raw materials and waste products into useful substances to subserve the comforts of human life, and to fit people for the struggle for national supremacy.

Unfortunately India so profusely abounding in raw Imports and materials, has so long been without proper Exports of India. facilities for technical education. We are so handicapped that though there are almost unlimited resources to make our own salt, yet we import Rs. 66,76,000 * worth of salt in one year for our home consumption. Though Indian soil is specially suitable for the production of any quantity of sugar-cane, we import sugar worth Rs. 8,73,81,000 from abroad. We export a tremendous quantity of cotton, jute, wool and silk worth about Rs. 52 crores, and in return get manufactured cloth from abroad. We export oil-seeds and import oil. India abounds in iron mines, but they are not worked and our demand is supplied by foreign smelted iron. With the imported iron, we cannot prepare our tools, machines, etc., but go to foreigners to buy from them more than 20 crores of rupees worth of these. We export our hides in quite a large quantity, to the value of Rs. 15,34,87,698 in a year, and import tanned leather, shoes, saddles and other leather articles. Indian mines can supply almost all minerals, but we cannot prepare chemicals with them and import Rs. 68,76,000 worth in one year. Almost all dye-producing stuffs are found in India and we use about one crore of rupees worth of foreign dyes. All materials for liquor manufacture are abundant in India, yet we use one crore of rupees worth of foreign stuff. Most of the raw materials of glass are lying in abundance in India, yet we import glass wares worth Rs. 1,21,14,000. India produces plenty of raw material for paper making, some of it is exported too, yet for our consumption most of it comes from abroad. Similarly there are hundreds of thousands of things, necessary for our daily use, of which raw material is at hand, yet for our supply we

* The figures are for the year ending March 1907.

depend on foreigners. A pitiful matter ! Throwing away our raw material worth Rs. 178 crores in a year and in return getting manufactured articles of 108 crores of rupees, the raw materials of which probably would not fetch even one-fourth of the amount. How can a nation bear such heavy loss every year? If the same dreadful state of things continues for a few years more, only God knows what will be the fate.

Our people must realise that for existence they have got

Our competi- to struggle hard in the markets of the world.
tors.

They are to meet with persons so advanced as to prepare in a single factory 1,000 tons of sulphur every day ; with persons manufacturing in a single factory 40,000 tons of calcium carbide annually, with persons using 2,00,000 H. P. Engines in a single factory, with persons employing 4,50,000 hands in a single factory, with persons one of whom can spend Rs. 6,00,000 only in exhibiting his manufactured articles in some exhibition, with persons using 60 highly educated chemists in a single factory—the majority of them doing independent research work, with persons who have such wonderfully big libraries as to have only buildings for one of them costing 6,343,000 \$ (dollar = Rs. 3-3), and the land on which it stands costing 535,000 \$, of which the shelves if put in one line would measure 60 miles, and have provision made for extension up to 150 miles of bookshelves. One can easily forecast the promising future of such nations.

Difficult as the situation is, success is not impossible as

Possibilities of the achievements of Japan testify. What
Success.

was her condition only 30 years back? Industrially, were not the Japanese worse off than we are to-day? But see how matters stand with them now. They have improved more than could have been expected during this short period ; they have proved themselves to be an exceptionally capable nation ; they have got their own industries nicely developed ; they put on home-made cloth, they make their own ships, machines, railways, etc., they use their home-made sugar, liquors, oil, salt, paper, drugs, explosives, matches, umbrellas and what not. They not only supply their own demand but also export their manufactures to other countries. Thus having awakened to a sense of her national importance, Japan has in such a short

time extorted recognition as one of the first class powers of the world.

Naturally the question arises, what were the important factors to bring about this wonderful improvement in so short a time. The answer to this is *thorough technical education*, and this is the chief thing that we badly need for our industrial regeneration. Without this education we cannot succeed in the struggle for existence and without it we are bound to continue to suffer from famine, starvation, and, it may be, ultimately to perish.

We should not only realise its necessity but should at once devote ourselves to its development. Instead of making our children lawyers, tahsildars, deputy collectors or even collectors and commissioners we must make them engineers and captains of industry. Let them go in thousands in this direction as they did in Japan.

By this I do not mean that students should be sent to only foreign countries for technical training. If I did so, I should commit the grossest mistake. I must say that for the technical education of our children, our own technical institutions are most urgently needed, and are of paramount importance. Without such institutions our students abroad meet with insurmountable difficulties and cannot take full advantage of their foreign travel. As I have myself experienced difficulties I write with some knowledge of the matter.

At present some young men go abroad immediately they finish their college or school education without any knowledge of the industrial conditions of the country. Consequently they are unable to make the right choice of subjects, etc. They have to begin there at the very beginning and then go through their respective courses without reference to local conditions. The best of training received under such circumstances can but be imperfect. They come back without any capacity for organising their home industries, and even do not know what they shall do with themselves. Naturally the result is very disappointing.

Secret of
Japan's Success.

Wanted
National
Technical
Institutions.

A Mistake that
must be avoided.

I would, therefore, suggest what has been so successfully demonstrated by the Land of the Rising Sun, that we must start technological institutions in our own country, where the students may receive the best training that may be possible under the circumstances and at the same time be familiarised with the quality of the raw materials, labour supply, etc., of the country. After acquiring such knowledge they may profitably go to some foreign country for completing their education.

Such men when they return will be of real service to themselves as well as the nation. I repeat that the results of sending untrained young men to foreign countries will continue to be disappointing and that there is absolute necessity for increasing the facilities for such training in India itself.

Here I wish to add that mere talking and passing resolutions would not do any appreciable good; we must take real action at once. We have long spent our energy in convincing people of the necessity of action, the time has come when it ought to be spent in real action. If we honestly and sincerely work in this direction and can establish a few technical colleges and schools according to our present needs, in a short time we shall see the condition of India changed a great deal for the better. Fortunately we have got quite a number of Indian gentlemen trained abroad in technology, their services will be of very great advantage in starting these national institutions. I request them to give their help for the sake of their own brothers and children and even for their own selves.

I know and hear every day that a number of patriotic individuals and various societies are sending students abroad for technical education. I would request them to cooperate and utilize those sums to greater advantage by starting technical institutions in the country. I often hear of gentlemen spending their lives for the public good. I am of opinion that they cannot do better service under the present circumstances of India than to help in the establishment of technical colleges. There is the greatest need for workers in this field.

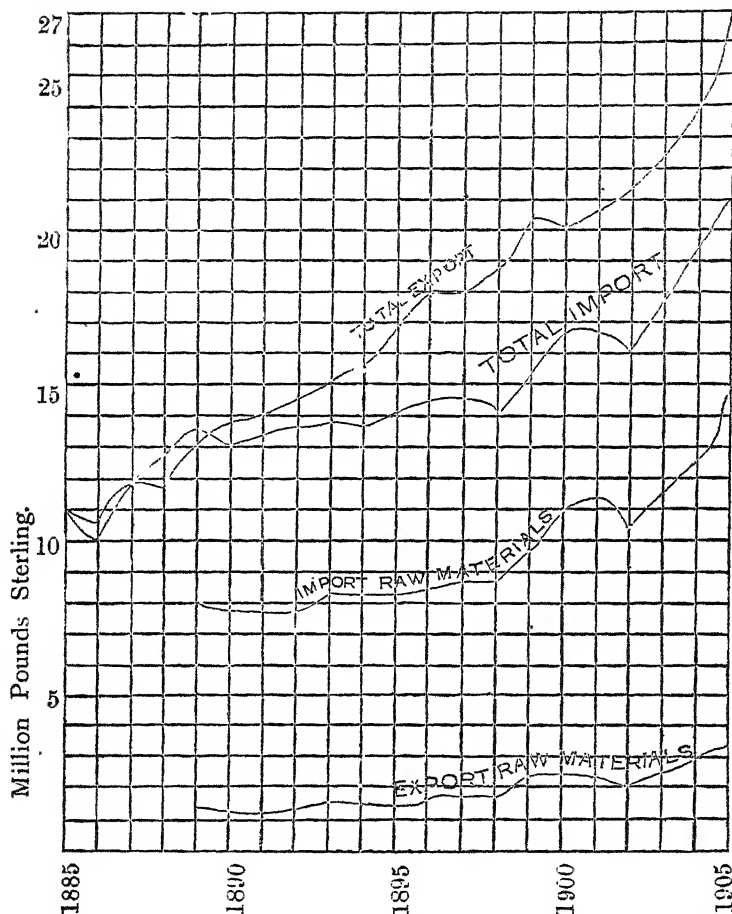
Now before coming to my own scheme of a technical college, I think I had better give some particulars of what is being done in other countries which are very advanced.

Probably Germany is the best example to take for our present purpose. The United States of America have a very well developed system of science education as well as very large engineering works and other factories. Yet Germany has her own speciality ; she has spent less money on education while she reaps even better results. All over the world, for many years past, the scientific training in the German Universities and technological institutions has been held up as a model. This fact is well proved by the most healthy condition of her industries, as shown by the table and the diagram of imports and exports given below.

Table showing twenty years' improvement in the Chemical Industries of German Limited Liability Companies as shown by Dr. James T. Conroy, B. Sc., Ph. D., in one of his papers for the Society of Chemical Industries, London.

Year.	No. of Companies.	Paid-up Capital	Dividend.	Average rate per cent.
		£	£	
1886	82	8,127,042	582,995	7.17
1890	82	9,903,655	1,269,160	12.50
1895	95	12,369,045	1,575,427	12.7
1900	121	17,424,650	2,147,707	12.3
1904	143	22,350,650	3,109,785	13.8

Diagram showing exports and imports of the German Empire as given by Dr. James T. Couroy, B. Sc., Ph. D., in one of his papers for the Society of Chemical Industries, London.



To make the comparison with India easy, let me here give the area and population of the German Empire. Her area is 208, 830 sq. miles, *i.e.*, less than one eighth of India ; and her population in December 1900 was 56, 367, 180, *i.e.*, a little more than that of the United Provinces of Agra and Oudh.

This table clearly shows the rapid improvement of the industries of Germany in every respect. The profits vary much for the different industries and even for different

works manufacturing similar products. At present the best results are achieved in the aniline dye industry. There are 31 aniline colour works in Germany, but the bulk of the trade is in the hands of five firms forming two large combinations. The combined capital of these five firms is nearly £5,000,000, and the net annual profit is £2,000,000, 60 per cent. of which, i.e., 24 per cent. of the capital, is paid in dividend, the remainder going to depreciation and reserve. The average dividend paid by an aniline dye works has exceeded 20 per cent. for years past; the dividend paid by individual firms has in some cases exceeded 30 per cent. One of the firms started in 1865 with 40 men, and now after a long struggle of 42 years, it employs 7,251 hands. Is it possible for a country the industries of which grow at this rate to be visited by periodic famines? Do you not think and realise that we would have saved so many lives in our recurring periods of drought had we manufacturing industries like Germany?

Now coming to the diagram, what an instructive lesson it teaches; it at once shows the secret of national prosperity. The bottom line shows what a small quantity of their raw material they export, their exports principally consisting of their manufactures. In imports they have large quantities of raw material and comparatively less of manufactured goods. Taking the year 1905 for example, the figures are :—

		Imports.	Exports.
Raw materials	... ..	14,527,950	3,325,550
Manufactures	... ..	7,014,550	23,791,550
		<hr/>	<hr/>
Total	... ..	21,542,500	27,117,050

This is successful business. But just compare how things go with India. In fact there is no comparison, as we import everything in the manufactured form and export our raw materials. We leave our masses to starve while other lands fatten on India's natural resources. Is this philanthropy? Nay, folly.

Surely we have to mend the existing state of affairs. To know how to do so, let us see what other countries have done. I again turn to Germany for an example. She has striven for success, she has worked for many years with a definite object in view, she has supplied a superior technical education to her people, she has devoted a great deal of time, energy and

money to research in the manufacturing industries, and her Government has got closer touch with the manufacturers. Their technological institutions give D. Sc. and Ph. D. degrees to students numbering 400 (in round numbers) every year and a majority of them become professors in Technological Colleges as well as find employment in works as consulting chemists, analytical chemists, research chemists, managers, and so on. Thus having a highly valuable system of technical education of unrivalled completeness, the manufacturers are able to make every possible improvement in the articles they turn out. This is made clear by the list given below abstracted from a most interesting and exhaustive paper by Professor Dinsberg published in 1896. The table is 11 years old but is none the less interesting on that account. We have every reason to believe that a similar table, prepared to illustrate the conditions of to-day, would be even more striking :—

Branches of Chemical Industries.				No of works.	No. of chemists employed.
Metallurgy	...	...	...	5	24
Heavy chemicals	...	...	...	13	90
Manure works	...	...	...	4	8
Salt works	...	...	...	4	25
Inorganic products	...	...	...	2	7
Mineral colours, etc.	...	...	...	1	31
Fine chemicals	...	...	...	6	26
Organic aniline, glycerine, etc.	...	...	...	14	56
Tar distillation	...	...	...	10	26
Pharmaceutical works	...	...	...	7	31
Explosives	...	...	...	4	28
Tar colours	...	...	...	9	241
Essential oils	...	...	...	3	13
Textile printing	...	...	...	1	5
Grand Total				83	633

This table tells us the secret of their great success. At present Germany has a sort of monopoly in coal tar colours ; this table at once shows why. Because the tar colour manufacturers engage such a large number of chemists. According to the table the average number is about 27 chemists in one factory. I myself saw one factory in Germany employing 60 chemists, most of them engaged in research work. This is how they revolutionise industries. The factory referred to above played the most important part in driving our indigo out of the market.

Most of the factories in Germany take none but diploma-holder chemists ; some of them require additional knowledge of engineering. There every process is placed under the management of a duly trained chemist who has to take the responsibility for the work turned out. These chemists are provided with residences close to works. In short they in Germany trust science.

In a discussion at a meeting of the Society of Chemical Industry, Professor Wilhelm Ostwald, a famous German chemist and author, said that several years ago, when the newspapers managed once more to show the appearance of strained relations between Germany and England, one of his colleagues pointed out that in case of war, the export of saltpetre from Chili to Germany could be interrupted by England and that then they would have to stop fighting altogether (as saltpetre is needed in the manufacture of explosives). This position being unbearable to a patriotic physico-chemist, some remedy had to be discovered. Before a fortnight was gone, his assistant, Dr. Braner and himself found out experimentally how to transform ammonia into strong nitric acid, with an output of 100 per cent. of theoretical value. This, he thought the main thing was done ; but when the process was tried on a large scale it became at once clear that *one* invention was *no* useful invention, every such requiring quite a number of secondary ones for it to be turned to practical advantage.

In a year or so, however, these difficulties were got over, and an output of 15 per cent. to 92 per cent. was reached in a plant built on the scale of a small factory. Now they were converting about 50 tons of ammonia a month into nitric acid.

Advantages of
Home Education
exemplified.

During this whole development he never found any difficulty in getting money for these experiments on a large scale. Wealthy men there are quite accustomed to spend money on costly experiments, the issue of which was uncertain though hopeful, when the thing was based only upon laboratory experiments, *i.e.*, upon scientific evidence.

I should say that every word of Professor Ostwald has a lesson for us. He by a very simple example clearly proves of what mighty good our own institutions will be to us; that persistent application of science solves even very intricate questions, that money is never lost in experiments—rather one is the foundation on which to build others. We can also conclude that a foreign scientist would never have done what the German professor did in like circumstances.

I think I should come to my scheme now. At present in
 Branches of Technology, applied science is generally
 Applied Science. grouped as under.

1. Chemical Engineering.
2. Mechanical Engineering.
3. Textile Engineering.
4. Mining and Metallurgy.
5. Electrical Engineering.
6. Civil Engineering.
7. Architecture.
8. Naval Architecture and Naval Engineering.
9. Sanitary Engineering.

Of course it will be the grandest thing, if we can start colleges giving all the courses enumerated above, but in the present condition of India we have to be more modest. To begin with I would recommend first the taking up of Chemical Engineering and Mechanical Engineering; of the latter, at least as much as is necessary in chemical works.

Chemistry is the mother of science; whatever and however small an industry may be, in some way or other it stands in need of the help of chemistry. Therefore, if adequate knowledge of it is not acquired, all our industries are bound to suffer. This has been well proved in our own country. There are good many industries which took root in India, or were carried on successfully by our ancestors not long ago, for instance,

Chemical
 Engineering.

various colours—madder, indigo, etc., calico printing, cloth dyeing, sugar, saltpetre, and so on, but not having a knowledge of chemistry we had to look on helplessly while they were killed in competition. It is well said in one of the Consular Reports of Great Britain, "Those countries which possess the greatest number of and the best trained chemists will, if the further necessary conditions are given, in course of time, become the richest and the most powerful." Just on this principle, as already shown, Germany, notwithstanding her unfavourable political situation, leads the whole world in industry and commerce. But what about us who had so glorious a past in sciences and arts? If any one says that we have good schools of science which turn out B. Sc.'s and D. Sc.'s I will quote for his behoof the observations of Sir William Ramsay, K.C.B., D.Sc., LL.D., F.R.S., the eminent chemist of Great Britain, who was invited by Mr. Tata, our well-known great philanthropist, in connection with his Indian Institute of Science. He said: "The degrees of B.A. and B.Sc. in the Universities of Bombay, Madras and Bengal, so far as science is concerned, are given almost entirely for book-worms. It is true that a little practical chemistry and physics are taught, but even for the M.A. degree it amounts to little more than a smattering, which cannot be seriously considered."

It is a matter of great regret that a country abounding in the great wealth of raw materials from one end to the other, should be left in such a sad condition. Our import list as already shown is full of the articles of which raw materials have been exported from India, and the same things in a finished shape are imported. This and other arguments given above sufficiently indicates the paramount necessity of applied chemistry.

To render chemical knowledge fully efficient, knowledge of mechanics is absolutely necessary. All chemical works have, in addition to purely chemical and exclusively manufacturing questions, a large number of engineering problems to solve. In fact, a chemical manufacturer requires quite as much attention on the engineering as on the chemical side.

Mechanical
Engineering.

Very large chemical works can afford to have an engineering department, and even smaller works can, and very frequently do with advantage, employ a special engineer. Most works, however, depend more or less on the engineering knowledge their chemists possess. Chemists who passed out 10 years ago mostly were not familiar with apparatus on a commercial scale, nor of the materials of which such apparatus is constructed ; but the daily growing competition does not allow such ignorance. Now the term ' chemist ' as Dr. Thorne said, means a man who has been educated on broad scientific lines, where the scientific foundations of the engineer and the chemist are combined, and in addition to that he requires a large amount, the larger the better, of experience in research work.

So far as regards the necessity of mechanical knowledge for a chemist, but even more is required. The installation of power house, the choice and the relative advantages of the various forms of prime movers, whether steam, water, gas, suction gas, or oil, selection of machines to be worked with, and last but not least, their improvement or repair as occasion arises, require a knowledge of mechanical engineering. In short, for our present purpose, these two departments seem absolutely necessary.

I would accordingly teach *Chemical Engineering* in such a way as to meet the needs of students who desire to acquire such a training in chemistry and mechanical engineering as will enable them to deal successfully with problems of construction, operation and maintenance of works of chemical industries. At present, the course may be one of three years, but sometime later it will have to be prolonged to four years.

The whole course should include :—

A good knowledge of the theory of the science of chemistry, both organic and inorganic, a thorough knowledge of analytical chemistry ; a good knowledge of metallurgy ; development of taste for research and original work and considerable practice in the same in such a way as to develop self-reliance in the student, so that he may be fitted to make his way without depending on others' assistance ; a good knowledge of mineralogy ; superior knowledge of local conditions ; thorough

mechanical knowledge of transportation, evaporation, distillation, refrigeration, etc.; a good knowledge of chemical resistance of materials commonly used in construction and of their general applicability to chemical manufacturing processes; thorough instruction in technical chemistry including lecture and laboratory courses, special attention being paid to the methods of conducting both the mechanical and chemical operations involved in various manufacturing processes; while at the same time the chemical principles upon which the operations rest should be thoroughly taught.

Other subjects such as higher mathematics, mechanical drawing, physics, commercial economy and industrial management should also be taken.

The instruction in the last year should be so arranged that the students can exercise a certain choice as to the subjects (particular industries) to which he wishes to devote his special attention and carry on independent work in that particular branch under the guidance of professors, so that in his future life he can ably and successfully conduct and improve the business.

A fair idea of steam engineering and dynamo electric machinery should be given.

The German language may advantageously be taught as most of the advanced works in chemistry are in this language.

For mechanical engineering at present only an abbreviated course may be taken and it may be improved later on; however, the course should include :—

Higher mathematics, physics, applied mechanics, general principles of mechanism, construction of gears, teeth, valve gears, machine tools, cotton machinery (specially treated); course on thermodynamics, steam boilers, steam engines, applied dynamics, hydraulics, foundation, etc.

Knowledge of local industries, commercial economy, industrial management, etc.

This is a suggestion for the beginning. changes may be made according to requirements.

Last, but not least, is the question of finance. In order to give an idea of the funds required I give a table of appendix to this paper showing the establishment, capital cost and yearly income of some

Estimate of
Funds.

of the technical institutions of the United States of America. It is impossible for anything on a like scale to be attempted in India at present. I, therefore, give what I conceive to be the lowest possible figures to start with. An institution as outlined above, will require at least six laboratory halls, two drawing halls, one power house, one machine shop, one hall for foundry, carpentry, etc., six lecture rooms, and two office rooms costing probably a lakh of rupees; another lakh of rupees will be needed for machines, tools and laboratory establishments. The monthly expenses of the staff will be Rs. 4,000; with this we can have twelve professors (two or three foreigners in the beginning at least, a majority of Indians who have acquired training in foreign countries, and a few men trained in India itself, one Principal (Indian) and some assistants and clerks necessary for the staff.

Here only a rough idea of the proposed technical college has been given, full details on the most improved lines adopted in Germany and America could be given when some provision is made to start one. Now, let me just say how much benefit can be derived from this institution.

It is an established fact that most of the gifts of nature are hidden in the bosom of India in the form of mineral and vegetable products. But unfortunately we have very few amongst us who can recognise them and still fewer to tell their economical uses. Sufficient knowledge of chemical analysis and applied chemistry will at once remove this difficulty and will enable men to work this essential wealth. In the Central Provinces people are making good fortune out of manganese. This mineral even now is exported in its raw condition; if some men of knowledge are there, the ore can be worked in India itself. This is a very simple example, there are hundreds more of every type and great importance not unfrequently met with in daily paths of life.

Then there is quite a large number of industries the success of which entirely or mostly depends on the knowledge of the two departments of engineering referred to above. A few of them I name below. The Chemical Engineers of the proposed college will not only be thorough masters of the chemical part of the industry but will command the mechani-

cal knowledge too. The mechanical engineers shall be of great help in improving mechanical appliances of our old industries as well as of new, in erecting them most economically and in founding new industries as far as the mechanical part of the manufacture is concerned. Moreover, the college staff will always be available to help the students in their future projects so as to ensure success in their enterprise.

NAMES OF SOME OF THE CHEMICAL INDUSTRIES.

Heavy chemicals as acids and alkalies.
 Fine chemicals as salts and other chemical products.
 Mineral colours.
 Aniline colours.
 Coal tar colours.
 Dyeing and calico printing.
 Pigments, paints, varnishes.
 Essential oils.
 Essences.
 Soap, glycerine and lubricants.
 Illuminating gases.
 Coal tar distillation.
 Pharmaceuticals.
 Petroleum refining and bye-products.
 Candle making.
 Explosives.
 Photography.
 Glass making.
 Porcelain and pottery.
 Cements.
 Enamel wares.
 Bricks and tiles.
 Rubber making.
 Paper.
 Starch.
 Sugar.
 Wine brewing.
 Distillation of spirits.
 Wood distillation, vinegar, etc.
 Fertilizer and manure.
 Leather tanning and dyeing.
 Metallurgy.
 Electro-plating, etc.

Many of the heads named above include a number of industries; there are further many petty industries like ink,

matches, pencils, parchment, fire proofing, water proofing, condensed milk and other dairy products, etc., etc., which all depend on applied chemistry. Other industries will also be helped a good deal as up-to-date sizing and finishing in textile factories can be done only through the help of the best experts in chemistry. The users of furnaces, boilers, etc., can be much profited by the analysis of smoke and water; by finding the calorific value of fuels, great economy can be made in selecting and purchasing it.

In short such a college as is proposed will produce men who will recognise the wealth hidden in earth, will work it up, earn an independent livelihood, and enrich the country.

From what has been said above one can easily realise what enormous benefit can be reaped from investing a reasonable sum of money, and how a foundation of prosperity can be laid not only for ourselves but also for the generations to come. I, therefore, appeal to the general public to work out this problem honestly, sincerely and with active zeal in the interest of the whole nation, in the interest of ourselves and our own children. As soon as this is done, there is sure promise for the development of the indigeneous resources and for the growth of innumerable industries which will give employment to millions of people and save India from the constant dread of famine and hunger.

APPENDIX.

Table showing Establishments, Funds and Incomes of some of the Technical Institutions of the United States of America in the year 1904.

Name.	Tuition fee and other fees.	Value of books in the library.	Value of scientific apparatus and machinery.	Value of ground and buildings.	Production funds.	Tuition and other fees.	INCOME.				Total.	Benefactions.
							From productive funds.	State or city appropriation.	Federal appropriation.	From other sources.		
Massachusetts Institute of Technology	\$ 250	\$ 186,302	\$ 360,000	\$ 1,423,524	\$ 1,222,221	\$ 302,741	\$ 65,000	\$ 25,000	\$ 8,333	\$ 35,734	\$ 486,808	\$ 101,394
Armour Institute of Technology	120	...	400,000	350,000	1,750,000	90,000	50,000	...	...	...	140,000	250,000
United States Naval Academy	...	100,000	200,000	7,000,000	...	...	...	...	330,897	...	330,897	...
Iowa College of Agriculture and Mechanical Arts.	24	30,500	349,000	721,276	683,709	17,818	41,177	221,080	40,000	29,332	319,107	...
Kansas State Agricultural College	30	46,400	205,089	413,575	492,381	10,464	25,688	152,202	40,000	...	228,357	...
Michigan Agricultural College	...	45,564	163,271	449,190	956,180	16,084	67,313	100,000	40,000	40,503	253,000	...
Purdue University	55	18,600	188,250	655,900	34,000	43,273	17,000	147,701	40,000	10,943	258,917	...
Stevens Institute of Technology	225	18,000	60,000	400,000	810,000	51,051	34,331	...	...	17,392	102,684	1,559
Case School of Applied Science	110	10,000	90,000	566,000	...	...	...	...	...	...	...	200,000
Colorado Agricultural College	3	21,605	114,000	27,800	95,000	1,101	9,968	75,410	40,000	7,826	134,365	...
Oregon State Agricultural College	3	...	24,000	191,000	169,452	794	10,944	25,109	40,000	2,294	79,147	...

COOPERATIVE CREDIT IN AGRICULTURE.

BY JOGINDRANATH SAMADDAR, ESQ.,

Kachubaria, Kasinagar, Jessore (Bengal).

"At a time like the present, when the public gaze is so fixed upon *Swadeshi* manufacturing industries, the all-important fact is apt to be lost sight of that *Swadeshi* manufactures are themselves almost entirely dependent for their success *on the success of agriculture*. That this is so will at once be apparent when it is realised that the manufacture of *Swadeshi* piece-goods can only be successfully established when it has been found possible to grow suitable cottons, and that when the growing and manufacturing problems have been solved the question of markets will be found also to depend on agriculture for the simple reason that the great market for piece-goods is the agricultural population, and the more flourishing the population is the more can it afford to spend on manufactures."—*Sir D. M. Hamilton at the Benares Conference.*

"Few people talk of the *Swadeshi* movement in connection with agriculture. But really that is the industry which most requires the application of the true *Swadeshi* spirit, for on it are based all our possibilities of manufacturing industries. If the mill industry flourishes in Western India, it is because the Guzerathi is acknowledged on all hands to be the most efficient cultivator of cotton in India. So long as agriculture is carried on in the present primitive fashion, no great industrial improvement need be expected in India."—*The Hon'ble V. D. Thackersey at the Calcutta Conference.*

I begin this paper by quoting two passages from two speeches. I will quote yet another. His Highness the Maharajah Gaekwar said :

"Famine, increasing poverty, wide-spread disease—all these bring home to us the fact, that there is some radical weakness in our system and that something must be done to remedy it. But, there is another and larger aspect of the matter, and that is, that this economic problem is our last ordeal as a people. It is our last chance. Fail there and what can the future bring us? We can grow only poorer and weaker—more dependent on foreign help. We must watch our industrial freedom fall into extinction and drag out a miserable existence as hewers of wood and drawers of water to any foreign power which happens to be our master. Solve that problem and you have a great future before you, worthy of your ancestors and of your old position among nations."

Does it not then seem not only a matter of expediency but our duty to our motherland as well as to posterity to see that agriculture and the agricultural class thrive to bring about the industrial regeneration of India? Even protectionists admit that the agricultural industry must reach a high state of development before manufacturing industries can be

brought to develop. It is said that history repeats itself. In England, the era of Arkwright, Crompton and Hargreaves was preceded by the era of agriculture. And, therefore, if the real regeneration of India must come, history should repeat itself here also and the great industrial activity which is being marked throughout the country must be preceded by agricultural activity.

Unfortunately agriculture is not thriving and the pity of it is that we are not zealously trying to make it thrive.

Cooperation, one of the greatest if not the greatest of economic forces should be employed to ameliorate the condition and improve the credit of the raiyats. This falls into two classes : (i) Cooperative credit in money, and (ii) Cooperative credit in grain. The first is promoted by cooperative credit societies and the second by cooperative grain banks.

COOPERATIVE CREDIT SOCIETIES.

The question which faces all small agriculturists is the question of money, *i.e.*, how to obtain the money which is necessary for his operations at a rate of interest which would suit his purpose, that is, which would make him draw the greatest amount of profit out of the sum by employing it in his business, by enabling him to pay his creditor without any burden to himself. This problem of how to get cheap capital is not confined to India. Even in Europe the state of affairs is the same. In India, however, the problem is aggravated by the fact that Indian rates of interest are to some extent survivals from times when the security which the agriculturist had to offer was of far smaller value than at present, and also by the fact that the money-lender has not been slow to take advantage of the unwillingness of the Courts to go behind the terms of a written bond ; or, as the late Viceroy in his speech said, " The conditions under which alone he can procure it in this country are so onerous, he is so apt to dissipate it when acquired by a sort of traditional improvidence, and the consequences of his indebtedness are so disastrous and even appalling."

The rate of interest here is appalling. It is 24 per cent. Here the raiyats borrow to live. They have no other motive—they have no other alternative. The result is that they live as

debtors not only throughout their own lives, but in many cases they leave their debts to their descendants.* The axiom, "To buy finance cheap and sell the produce dear" unlike other axioms, is reversed in India, inasmuch as here the raiyat sells his produce cheap but buys his capital dear.

How is this to be removed? The raiyats must have money and this can be procured and the disadvantages removed by the introduction of cooperative credit societies throughout the length and breadth of the country.

I do not here propose to enter into the details of the Act of 1904. Worthier people have dealt with it even in previous conferences, though I am not sure whether it requires still more advertising. I shall here content myself by narrating the advantages—economic, moral and educative—of this. A cooperative credit society infuses a spirit of unity, it promotes fellow-feeling, it inculcates business habits, it encourages economy, it also encourages industrious and sober habits. It is an open invitation to the idle and the extravagant to mend their ways because until they mend their ways they will not be permitted to enter—as one happily puts it—"its sacred precincts."

Again, in a rural credit society, every member will have an equal voice in the management of its affairs. As a committee will have to be appointed by the members themselves to manage the business and auditors to audit the accounts, the society will have an educative effect on the members.

And last but not least, apart from the advantages which the members themselves will derive, the wholesome effect of such a society on the neighbourhood will be great. The Post Office Savings Banks are doing a great deal of good in the way of teaching us frugality and economy. As the money deposited in the banks of the Society will also pay a like interest apart from the fact that this money will be spent for the benefit of the villagers themselves, a spirit of depositing, as it were, will arise among them.

Steps, however, should be taken to minimise the disadvantages. The *Pioneer* in one of its issues once observed that in the Punjab there had been some failures owing to the members being granted large sums for extravagant marriage

* "This poverty is an old, a very old inheritance." *Justice Ranade*.

expenses. It should, therefore, be the earnest endeavour of all to see that the purposes for which societies lend money should be good and useful.

I need not detail here the advantages and privileges which the Government has conferred on these societies—these are too well-known. I would only say that in this respect, Government has fully done its duty as the greatest landlord, while I regret that the lesser landlords are not doing their duty. It should be incumbent on them to see that while the raiyats suffer, the suffering of the zemindars follows *paripassu* and that the prosperity of the latter invariably leads to that of the former.

B.—COOPERATIVE GRAIN BANKS.

In Europe, to ameliorate the condition of the raiyats and Italy and Spain. to help them to anticipate their crops at fair rates, the Governments of some countries have done something. There are the *Monte Frumentarii* of Italy and the *Positos* of Spain. The former were established by the Government itself in the fifteenth century with the object of supplying advances of grain. Communal councils under the supervision of district authorities managed these. Loans in grain for maintenance when necessary and for seed in all cases were granted. The Church more than the Government was instrumental in the growth of the *Positos*. As in the former, the communal council used to distribute the surplus grain. Now, the village council manages these and there are full and extensive regulations. The rates of interest are $4\frac{1}{2}$ per cent. on a grain loan for crop period. The district committee works gratuitously, while the village council is allowed one-sixth of the profits to cover expenses.

Compare the above rate of interest with the rates of interest prevailing in Bengal. I state here the rates prevailing in a few districts.

(a) In Rajshahe (Eastern Bengal and Assam) the rate is 33 per cent. in grain.

(b) In Burdwan (Burdwan Division, Bengal), if a person borrows 20 seers he has to pay 25 seers. The time for borrowing in general, is, from *Faistha* to the end of *Bhadra* and is payable up to the end of *Chaitra* of the same year. If it is not

paid, then the whole of it, *i.e.*, 25 seers will be calculated as principal the next year.

(c) In Jessore (Bengal, Presidency Division) the rate is generally 50 per cent.

(d) In Barisal, the granary of Bengal, it is also 50 per cent.

Does not this prove the necessity of Agricultural Co-operative Banks where grain can be stored and from which the poor raiyats can be provided with it? I shall put forward one more argument. At present after a bumper harvest, the supply being great relatively to the demand, the prices come down very low, and large quantities are bought at low prices by foreign merchants who are very prompt in their manoeuvres. The result is that the supply of corn in the market is soon diminished and the prices again rise. Those cultivators who have already sold their corn gain nothing by this rise in prices. On the contrary as their rents are fixed in money they have already suffered a great deal by the fall in prices and the only result is that owing to a sudden fall in prices a larger quantity of corn is exported from the country than would have been otherwise. Surely these banks may gradually be the means of accumulating the surplus grain in the village.

In a year of prosperity the villagers of a village preserve and collect together a stock of grain. By inducing village communities to keep a common stock of grain in a good year and by profitably investing the same in comparatively bad years and among themselves, a reserve might be built up which would enable the villagers to keep them going during a period of scarcity and also to avoid a calamity through any sudden failure in crops. It is a fact that in every village there is a number of poor people who in prosperous years even are in want of food-grains for a period preceding the harvest time. These poor people will be in a position to resort to these banks more readily for immediate want and when actual famine attacks the village, these will serve as permanent grain stores which at any time throughout the year any poor villager may have recourse to.

To avoid the misery which the raiyats are subjected to, Rai Parvati Sankar Chaudhuri, a very enlightened zemindar of Dacca, induced his tenants to establish a grain bank. This he named *Dharmagola*. Finding the collection of paddy a little irksome his tenants collected Rs. 105-5-9 from the villagers at Teota and purchased some 80 maunds of paddy. In eight years the stock rose to 1,360 maunds. Rai Parvati Sankar Chaudhuri has established several other *Dharmagolas* amongst his tenants.

A Dharmagola has also been established at Panchamala in Khulna by Babu Jadunath Biswas, zemindar of the place, and in its establishment the present writer had some hand. But for the comparatively prohibitive prices of grain owing to the scarcity, the present writer would have been able to start a number of them in Jessore and Khulna.

Edmund Burke in a pamphlet which he wrote and published—"Thoughts and Details on Scarcity"—discussed the subject of public granaries. But Burke failed to hit upon a scheme which could remove the obstacles. Burke supposed that the construction of such granaries would not be feasible for three reasons—(1) the cost of construction would be large, (2) the management and attendance would require an army of attendants, agents, storekeepers, and (3) the decay and destruction of corns which he apprehended would be a dreadful drawback of the whole dealing; and dissatisfaction of the people, at having decayed, tainted, or corrupted corn sold to them, as must be the case, would be serious. In the scheme of Rai Parvati Sankar there would not be in the least any hindrances, and we really wonder how the simple expedient of replacing the old corn by new corn in every convenient year could escape such an acute thinker as Burke*. One of the chief recommendations of the "*Dharmagolas*" is that in a year of famine, the great difficulty of the transport of grain to affected areas vanishes altogether under this scheme, for

* I may note here that Rajah Peary Mohan Mukerjee, C. S. I., of Utterpara in a letter to me says that he agreed with Burke.

every village is provided in its "Dharmagolas" with a stock of grain which is enough to last the period of famine.

These grain banks can be established in other Provinces as well. For, not only paddy but all the other staple crops of the different provinces in India may also be kept in *golas* or banks at least for a certain number of years. *Jowar* is the staple food crop in Madras, Bombay, Central Provinces, as well as in the United Provinces. *Jowar* does not deteriorate at least for five years and even if the contrary happens for some cause it may be easily exchanged for fresh stock at the beginning of each year.

The advantages of grain banks are in short, as they have been expressed from time to time in all the newspapers :—

1. These can be established in each village from its own resources.

2. The contribution of each individual being only a small portion of the annual yield of grain, is not likely to cause him any hardship.

3. The cost of the up-keep will not be heavy as the staff will be honorary.

4. On the accumulation of a stock of grain, old grain can be exchanged for new grain securing a profit as well as preventing sickness which is incidental to the consumption of new grain, specially new rice.

5. The banks would allow them to appropriate better prices.

6. The reserve stock of grain will be the permanent fund.

7. The banks will have an educative effect.

These, in short, are the advantages. Needless to say, there are lots of minor advantages.

It would not be altogether, I venture to suggest, unnecessary to draw a comparison between cooperative credit societies and cooperative grain societies or banks. The

* The promoters of the *Bangabasi* newspaper have also started an association, "The Anna Rakshini Sabha", the object of which is to induce people to store grain in Grain Banks and thus prevent export. It has as its supporters such men as the Maharajah of Darbhanga, the Maharajah Tagore and a large number of other zemindars, etc.

former is an admirable thing in its own way and is sure to produce an incalculable amount of good. Credit societies, however, deal with money which is apt to be misapplied. Agricultural banks deal with grain—the staple food of the raiyats. In credit societies, the question of limited and unlimited liability presents great difficulty to the comprehension of our illiterate raiyats while the latter easily appeals to their minds. The money in credit societies is put out among its members only while the sphere of Dharmagolas is greater as their stock can be taken advantage of by all.

But credit societies dealing with money have one great advantage. Grain banks can be started only in years of bumper harvest. The former have no such disadvantage.

If we believe that the salvation of India lies in the mill and the farm rather than in the forum and lecture-hall, if we are to bring in a regeneration of India which lies not in political agitation and declamation only, but in the industrial development of the country, the utilization of its many and varied resources, the promotion and the encouragement by the rich and the intelligent of its indigenous arts and manufactures, it becomes the bounden duty of all to improve the condition of agriculture on which depends so much ; on it depends not only the well-being of nearly 90 per cent. of the Indian people ; on its development depends the industrial development of the country and in short on it depends our very existence. Loathe the bondage of ever lasting debt which weighs the poor raiyat down and do anything which would give him greater self-reliance and prosperity, and the whole nation will prosper.

INDUSTRIAL BANKS.

By MAGANBHAI CHATURBHAI PATEL, Esq., *Ahmedabad.*

Since the standard of Swadeshism was first raised by our Bengali brethren, things have undergone a great change all over India. Where we had sloth and despair before, we see tremendous energy exhibited in one form or another, sometimes in a way to bear fruit and sometimes misdirected and exhausted without any visible outcome. There is no doubt, however, that the spirit of self-reliance

and confidence in individual exertion is being aroused to a certain extent. Attempts are being made everywhere to build cotton mills, to start hand-weaving factories, and to devise various other means of helping the dying industries of the country. The idea of cooperation which was not heard at all sometime back is now agitating the minds of so many that without a special preaching of it anybody—even a man of small means—thinks himself able to collect some capital on the principles of cooperation wherewith to start some concern or other. Even village *shahukars* who had no confidence in a business carried on cooperative principles are now gradually realising its true worth; thanks partly to the extension of the Deccan Agriculturists' Relief Act to this part of the Presidency. It is true that many of these *shahukars* are simply ruined, but there are still some in whose hands money is lying idle and who when thrown upon the new ways of business are willing to help concerns carried on near to their doors on cooperative principles.

The Swadeshi movement has been successful to an appreciable degree in arousing the spirit of true patriotism and self-sacrifice. The people have changed their tastes and the idle desire to be fashionable has been replaced by the honest pride of wearing Swadeshi dress. In consequence of this the industries which were rapidly sinking have got a fresh start and thousands who were thrown out of employment are now earning their bread by honest means. It is no idle dream to think that if the forces that are at work at present continue to operate the very face of India may be changed.

In view of these forces and the general poverty of the people we are brought face to face with one very important question, how to finance the petty industries of the country on which live practically 50 per cent. of the Indian population. Big concerns like mills started by large capitalists no doubt support a number of labourers, but they have a tendency to concentrate vast moneys in the hands of individuals. If village industries are revived and made to flourish there would be a more equitable distribution of wealth and a more skilful and independent artisan class would be brought into existence. The lot of a country in which the proportion of

independent artisans is greater than merely well-fed labourers and big millionaires, is surely more enviable than that of one in which the reverse is the case. A solution of the problem has been suggested in this Conference and the idea of 'Industrial Banks' is no new one. I wish to push this idea a little further and to examine the difficulties in carrying it out and to suggest the remedies that strike me.

Since the year 1906 a few Indian banks have been established in Bombay. Before that the banking business was practically in European hands. Two big banks with a capital of three crores of rupees have been started and they are at present well on their way to success. Being carried almost on the lines of the old European banks they have not supplied the place of the industrial banks intended to finance small village and town industries. They have, however, proved the possibility of such banks. People are getting confidence in this new line of business and this in itself is a great gain.

Village agricultural banks fostered by the parental care of Government are another attempt in the same direction. These are new institutions and are being promoted by the energetic executive authorities. But their scope is limited. What is advocated here is that industrial banks should be started on more or less similar lines.

These should be started not in big cities, unlike the great mercantile banks of Bombay, nor in the unknown corners of the country like the village cooperative credit societies. From their very nature they should be started in district towns. Village artisans and manufacturers visit the neighbouring towns almost twice a week to buy materials on which they work at their homes. These artisans support a number of small traders in towns and the mutual help they thus render to each other creates some business activity in many parts of the district. These centres of village trade are gradually expanding and a demand for capital is created by the general spread of the *Swadeshi* spirit among the people. To meet this demand, therefore, industrial banks should be opened in the towns. Villagers and petty traders in towns cannot afford to go to cities to borrow money. Nobody knows them there and naturally they cannot command any credit. Some idle

capital in villages and towns will also find room for investment. Those who do not like to see their money invested in concerns that are carried on far beyond the places where they live will be willing to make deposits in town banks. Such banks being in the very heart of the population to whom they will lend, will be in possession of all necessary information about the condition of persons to whom they will be making advances from time to time. There is another advantage in selecting towns for these industrial banks. Cotton ginning and other factories working with small capital are multiplying all over the country. It will be a special convenience for such concerns to open accounts with these town banks.

The scope of these banks will not be confined only to the use of artisans and mechanics. We can avoid all difficulties in the case of industrial banks by inviting all classes of persons without restriction—all who have capital and who want to do regular business—to resort to them. It is not advisable to restrict the business of these banks to a particular class of artisans and mechanics, for thereby banking business will necessarily be handicapped. The industrial banks ought to be profitable concerns like any other business enterprise although the profits may have to be kept within moderate limits so that the initial object of the banks may not be frustrated. I should suggest that at the least one-third of the subscribed capital of an industrial bank should be exclusively employed in making advances in aid of local industries at a rate of interest not exceeding six to eight per cent. No other restriction will be necessary. The sacrifice that the *shahukars* will make in the restriction placed on the rate of interest to be earned on a fixed portion of the capital will not be felt much by them on account of the profits they will make on their other transactions in which the remaining two-thirds of the capital will be employed.

The capital of industrial banks should not be very large. A fair start may be made with two or three lakhs of rupees. As the advances that will have to be made to local artisans and traders will not be in comparatively large amounts, a larger capital will not be required. The advances, however, though they will be small, must be numerous, and so, the capital must not be under one lakh,

Numerous dealings with the artisans and manufacturers in petty sums bring in with them difficulties which are almost insurmountable without the help of the legislature. Although nothing is more desirable than to keep such business concerns entirely independent of all extraneous help it ought not to be forgotten that the assistance of the Government which wields the power of making laws is in some respects indispensable. To make our industrial banks a success it is necessary that the legislature should make their path smooth by a special enactment by which certain concessions should be made to these banks, in the matter of Stamp duty process, of recovery of loans, etc. I would not go into details in regard to the concessions that the Government may with propriety be asked to extend to cooperative industrial banks. Certain concessions are made by the Cooperative Credit Societies Act of 1904, and these may be suitably modified or amplified as special circumstances may require. I will only indicate one or two points briefly. The law might provide that the tools of the artisans and mechanics should be exempted from attachment. The law should also provide for the fixed portion of the subscribed capital of the bank to be exclusively applied to the industrial concerns and also for the rate of interest to be charged on such loans. The concessions made may not extend to the other dealings of the industrial banks but it should be left to the option of such banks to increase the minimum fixed portion of capital reserved under the Act even to the extent of the whole capital of the bank. The banks taking advantage of the special concessions should be registered under the Companies Act and the scale of the registration fees for such banks should be very liberally revised.

Under such a scheme as this the artisans, mechanics and small traders will have the advantage of fair dealings and low rates of interest and a certainty of credit given them if they are persons of some respectability in villages and towns. I can say from what I know of the *shahukars* that if some inducement be held out to them by the Government they will come forward to make the industrial banks a success. The Government need not object on principle to making concessions such as have been mentioned above, or even more liberal concessions, to industrial banks, as they have

conferred some substantial privileges on Presidency Banks, and as they have recognised the principle of making concessions in the case of the cooperative credit societies. If as many believe and as Government will admit, the organisation of capital is a condition precedent of industrial development, they will, we need not doubt, take kindly to, and foster by every means in their power these urban industrial banks. The initiative must, however, come from the people themselves. Will it be vain to look for this in these days of *Swadeshi* ?

THE PRESENT CONDITION OF LABOUR IN THE TEXTILE INDUSTRY, AND THE RESTRICTION OF WORKING HOURS IN MILLS.

BY S. D. SAKLATVALA, ESQ.,

Empress Mills, Nagpur.

The most prominent question for the textile industry just at present is the labour question, which we have seen discussed by all classes of people, the mill-owners with vested interests; the authorities with their official experience; the mill managers with their personal and direct experience of mill labour; the journalists not only in textile papers, but all and sundry; by the humanitarians who are moved by the oppression of the working classes; and finally by the general public.

The chief points brought out seem to be the so-called carelessness of the Indian labourer, and next his comparatively poor physique and hence poor outturn.

Before examining the present condition of labour as actually obtaining in our mills I shall first deal with the two points above referred to.

I. *Carelessness*.—In any and every complicated industrial organisation, where each individual workman is but a small constituent, there is certainly not a great motive for very careful work. If the mill-hands are apt to be careless, this is not a special difficulty of the Indian mill-owners alone.

Indeed, this carelessness is induced by the treatment which the labourers receive from their masters. With tactful supervision and the right spirit which should lead the workers

to understand that their own welfare is inseparably bound up with that of the company they are serving, this difficulty can be obviated, and the workers trained to a better habit of work by the mill owners themselves.

II. *Physical deterioration* will also result in most trades where men are obliged to work at one thing exclusively, but if proper precautions are taken this evil result can to a great extent be prevented. Let the sanitary risk of the textile trade be met by proper cleansing, necessary ventilation, and the correct inside temperature, let none be admitted who is visibly constitutionally unfit, and, above all, let the hours of work be reasonable.

It is in the hands of the mill agents themselves by providing suitable prizes to *train* their men to take a pride in being steady, careful, diligent, and cheerful and also making good use of their leisure which also *should* be provided.

Now, let us examine the actual condition of labour in our mills, and this condition will also, perhaps, give us a clue why the textile mills fail to attract intelligent and healthy labour, though other occupations and industries are not similarly afflicted—at least not to the same extent.

The conditions under which the textile industry in India in general is at present carried on are certainly unpleasant and unhealthy. Though in recent years there has been a great advance in sanitary precautions, fans and screens, and ventilators, how many mills in India have availed themselves of such necessary contrivances which would tend to ameliorate the hardships of the work-people?

In most mills lighting is far from perfect. Owing to long hours men are made to work till far into the evening, and men are supposed to piece threads and mend delicate broken warps in such light at such a time, and then some would talk glibly of careless work! Then again, though an attempt is made in most mills at ventilation, the ideas regarding it are very hazy—few mill owners or their representatives care to study the subject—and at most this attempt is a tentative one.

In some of the mills at Ahmedabad which I had seen, even an attempt has not been thought of. Has it never occurred to the agents that it is detrimental to the health of human beings to work the whole day in the close atmosphere of a

stuffy room with dirt on the floor and minute films in the air ? As a result the labourers must leave off and on, and go out to "take a breath of fresh air" as it were—fresh air which is denied to them in their working time. Again, a hue and cry is raised that the workmen are "habituated" to leave their work now and again. Surely even fish will come out on the surface of the sea to take in a puff of fresh air !

The same may be said as regards temperature which is regulated from every other point of view *but* the health of the operatives.

Another point to be noted is the latrine accommodation provided in the mills for the workmen. The Government rule provides that there should be one seat for every 50 operatives in Bombay and Ahmedabad, and one for every 35 operatives in other places, but the rule says nothing as to the *system* to be in vogue. Are the latrines built on sanitary principles? Do they serve their purpose well or simply stand as a conglomeration of dirt and filth, provided at all because they are required by Government regulation? It is thought necessary by Government to unnecessarily insist on a greater *number* of latrines altering the rule from one seat for every 50 to one for every 35 persons, but it is no thought urgent to insist on a certain sanitary system on which they should be based ! I think it is much better to have as few as possible of the latrines such as are provided in some Indian, specially Ahmedabad mills, instead of increasing their number.

If better arrangements are not made for the men how are they expected to form better habits ?

Yet another point which being evidently considered too trivial by the mill owners is seldom taken into consideration at all, is the provision of *pure* drinking water and some sort of a sheltered place where men could take their meals. It seems it is only lately that the attention of the Government has been directed to the provision of pure drinking water.

These evils in themselves are quite sufficient to repel instead of attracting labour. But as if the work was carried on amidst the most favourable conditions, the workmen are required to confine themselves to their work for 13 hours and even more, and that too, just during the hot season, when the mill owners themselves find their task of two or three hours'

work too much, and betake themselves to the hills! Of course, it is not suggested that mills in future should be built on hill-stations, but surely there ought to be some consideration for the men who amidst most aggravating conditions are required to put in 13 hours' work! And then a solemn complaint is made that the Indian labourer is "slovenly." Look at his Lancashire brother! By a subtle mathematical calculation which I am unable to understand it is "proved" that the Lancashire man does the work of 60 decimal point something of our men. Has it occurred to the man who invented this theory that if this Lancashire brother were put in the sort of mill above described, and made to do 13 hours' work, and required to produce as much as he does at home, and above all, given the comparatively low materials to work upon—that it would be a wonder if our Lancashire brother at the 'end of the month emerged alive from his experiment?

When such strained methods obtain in our textile factories, the wonder is not that labour is insufficient, but that it should be available even to the extent that it is. Perhaps the wages offered are sufficient to tempt even a few new recruits.

If, therefore, this labour question is to be settled once for all, the first step to be taken is to improve all or some of the conditions indicated above. From Government reports and from the experience of tea-planters it is evident that in spite of great demand for labour there is still an ample reserve for the textile industry to draw from.

In the first place we shall see how the defects noticed above may be removed in order to attract labour that is available.

At the outset it must be admitted that from our past experience it is needless to assume that mill owners of their own accord will combine to bring about these much needed reforms. On all or most of these points there already exist rules framed by Government. Let these be now reviewed and amended with the sole object of improving the health of the work-people.

Perhaps the greatest difficulty will be with regard to limitation of hours for adult labourers. There undoubtedly exists the need for curtailing the long hours now in vogue.

Mill agents have failed to rise superior to sordid considerations of a little gain from sweated labour, and unless there is *legislation* on the point, long hours will be resorted to. It may be and is objected that to invoke the law on such a point is to delegate to Government too much power of interference in restricting adult labour. But the real question is "Will this power be exercised for the good of the industry and the people it employs?" To this there can be but one answer—Yes.

It is self-evident that under present conditions of the work-people, in the interest of the industry itself, *some* regulation is necessary. And when conditions of labour are regulated neither by positive nor customary law, nor by associations, what is to become of the labourers under such a *regime*?

It is also asserted that no interference is required as long hours are merely a matter of contract between the employers and the employed, as it were, a matter of buying and selling in the market. But even in a genuine market prices are settled by *free* competition, and to imagine that all industrial relations are of the character of buying and selling is a grave fallacy. Whatever may be the arguments advanced the fact remains that under unregulated conditions on this point, multitudes of human beings will continue to labour with unremitting toil for *inhuman hours*, and working in most cases amidst horribly insanitary conditions! May I ask which is better—Government interference or the latter? If, therefore, the existing conditions as to light, ventilation, and other sanitary arrangements are altered and improved, and reasonable hours for work appointed, say 11 hours a day, there is no doubt the textile industry will attract labour, and the "labour problem" put an end to for a long time to come.

Several attempts have been made to tap labour from certain provinces, but these have not resulted in any gain as the attempts were made by individual mills, and according to the prevalent idea of "competition" among mill-owners labourers imported by one mill were snatched up by another. In some instances the new recruits were frightened away at the idea of doing hard labour for 13 hours, and preferred to earn a little less by doing more congenial work.

Here of course Government legislation cannot help the industry. It is for the industry itself to make sustained and organised efforts in this direction. Enough has been said on this to render any further comments unnecessary. All that is required is cooperation, and if for the good of the industry the mill agents cannot help themselves, there is nothing that can help them in this direction. The various so-called mill-owners' associations ought to join hands, appoint a committee and organise a system of procuring labour and training it, and dividing it amongst the various mills that have helped in the task. Then it will be for the individual mills to retain the labour that is procured for them either by a joint system or by their own enterprise. Here a few remarks as to the means of not only allowing labourers but keeping them to their new homes may not be out of place.

The first thing which should be provided for the immigrant is a model dwelling-place, not overcrowded, and with proper sanitary appliances providing space, light, ventilation, drainage and water-supply. In short, within the limits of possibility, all the working men should have a decent physical existence. The thing next in importance is to secure for them to a certain extent proper family life and each family must be left undisturbed in their dwelling place and in their work. As far as possible petty shops dealing in all necessary articles for the workmen should be attached to or be opened in close vicinity of their quarters.

If labourers are to be permanently attached to the works to which they belong, I would further even advocate the organisation of some sort of private and decentralized system of insurance against sickness, accidents and old age. In case of sickness adequate provision should be made for medical help and sick pay. I am well aware that most mills do supply a certain amount of medicine to their men, but there should be a more systematised effort. The men should also have certain provisions made for them in case of accident and partial or total disablement. This should not as it now does, depend upon the mere good-will or humanity of the masters, but help should be rendered as a just claim. And last but not least is the organisation of a system of old age pensions. Surely all mill-owners will admit

the claim of those who have served them well for 25 or 30 years, and surely these men, in the evening of their life, must not be left to a degraded poverty. To encourage thrift provident funds should be established which would leave the workmen a decent sum at the end of their labour, but beyond that help should be provided from the old age pension fund as a reward for long services.

I must repeat, schemes of this nature do exist in a few concerns, but generally speaking there is no adequate provision for such insurance.

Since for the present very little is done to elevate the working classes, who are looked upon as no better than the machines they work at—as much to be got out of them as possible—since so little is done to bring them to a proper status,—the above suggestions might seem Utopian to most of our friends. But let them not be discouraged by the apparent weight of responsibility which is proposed to be thrown on their shoulders ! The ultimate result will be their own good. The housing problem might present difficulties but there are many encouraging examples which prove that the difficulty can be overcome, and the resulting good is much greater than anticipated.*

As regards the promoting of family life amongst the operatives a great deal can be done by the operatives themselves under the guidance of the agents, provided *ample leisure* is also given for this purpose.

This again brings us to the question of short hours and in this connection another common fallacy needs also to be pulled down. As a "powerful" argument against limiting the number of hours it is stated that owing to less production, the profits of the industry will be curtailed. One "authority" calculates this loss at something like three crores but on closer examination this figure seems to have been arrived at by the same clever method of calculation whereby the comparative efficiency of the Indian and Lancashire labourers is mathematically gauged. The gist of all arguments on this point tends to show that the mill-owners are afraid that they will have to forego a fraction of their remuneration as managing agents,

* See the *Economic Review* of 1898, pp. 524—528. The examples are not quoted as they would take much space.

which depends upon the outturn. But even this fear is groundless. They forget the compensation that will certainly be made by the higher tone of the industry—better workmen, better work, greater out-turn per hour and saving in waste—and saving in wear and tear of machinery which is now run for a ruinously long time at a stretch, and then it is in the hands of these agents to add to their productive power by building new mills. Thus their remuneration need not necessarily suffer. So this theory of a disastrous financial deficit may also be put aside before the higher question of improving and elevating the labouring classes.

In conclusion, therefore, it is safe to assert that with a little more care on the part of the mill owners for the welfare of the working classes, with cooperation and joint organisation for importing labour—with sanitary dwellings provided—with pensions or provident funds established—with better discipline enforced—and the working time restricted to a reasonable number of hours—the textile industry of India has a grand future before it.

POST SCRIPT.

After I had completed the above report, my attention was drawn to a short paragraph in the *Boston Journal of Commerce and Textile Industries*, dated November 2nd 1907, headed "Mill Hours in 1853."

This paragraph is so very apposite to our subject that I cannot resist the temptation of copying it out in this place, and expressing a wish that the mill owners will care to profit by the experience and example of others.

MILL HOURS IN 1853.

P. H. Flood of Boston recently paid a visit to Lowell where he worked in the textile mills 55 years ago, and he met there several men with whom he laboured for wages that would mean starvation nowadays and hours that would *not* be *tolerated* at the present time.

Mr. Flood secured possession of a most interesting piece of paper on his visit, it being the time-table adopted by all the big Lowell mills in September 1853, providing for an average work day of 11 hours. That was considered a very great concession to the employes, because prior to that time the regular schedule called for 14 hours of labour per day.

Mr. Flood says that prior to 1853 all the employes in the mills

had to be in the mills and begin working at 5 o'clock in the morning. At 7 o'clock the bell rang and they had a half hour for breakfast and during that time they were obliged to eat and be back at their looms on other duties.

At 12 o'clock the hands had three quarters of an hour for dinner, and coming in again at 12-45 they worked steadily till seven in the evening when they were dismissed for the day and had a chance to get their supper.

In 1853, Mr. Flood says, Benjamin F. Butler was elected to the Legislature for the first time. He introduced a bill making 10 *hours* the legal time for the employes of the mills. The managers of the mills bitterly opposed this legislation, and in the end the bill failed because a compromise was arranged, and in a spirit of what they considered great liberality the mill management offered a schedule which called for an average of 11 hours a day taken one year round. Then follows an interesting time table and then it is remarked,

'In these days the employes of the Lowell mills work 58 hours a week and there is a sentiment that *that is too many*. Also the employes of the mills now receive much higher pay than in 1853.'

Is it then too much to hope that our mill agents will also make an effort, and be at least as up-to-date in 1907 as the American mill-owners of 1853? Let our mills be behind the others, but surely we must discontinue a system in our mills which obtained in Boston only *prior to 1853*!

THE ARTS AND INDUSTRIES OF SIND.

By KUNDUNMAL MANGHIRSINGH, Esq.,

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Exhibition Committee, Hyderabad (Sind).*

The province of Sind from which I come, is at the present moment very backward industrially. At one time we were far ahead of some other provinces and our province was famous for her indigenous products. But alas! owing to keen competition our industries are deteriorating. It is not only that our local manufactures are not exported outside the province but they are not patronized to any appreciable degree even by the Sindhis themselves and the result is that some of them are dead and others are dying. Unless the new *Swaleshi* spirit spreads in Sind as it has done in several other parts of India, the fate of Sind industries is sealed. As matters

stand at present, one cannot help sounding a note of despondency regarding almost one and all of them. The important arts and industries are :—

1. Glazed pottery known in our parts as Kashi work and among Europeans as Hala pottery.
2. The lacquered work.
3. The cloth printings.
4. The silk and gold thread embroidery.
5. Cloth manufactures—hand-loom.
6. The carpet industry.
7. Sugar industry.
8. Mats and reed work.
9. Leather industry.

I.—*Glazed Pottery.*

The glazed pottery seems originally to have been introduced into Sind by potters who came from *Multan* or *Kashi*. The Sind glazed pottery very much resembles the Multan pottery, but in variety of colour and gloss is even superior to the latter. The chief centres are Hala and Nasarpur in Hyderabad District. It is after the first named place, Hala, that the Europeans have named the pottery. A village in Rohri Taluka too boasts of this industry. The Sind potters produce a variety of beautiful artware, such as vases, flower pots, water jars, pickle jars, tea-pots, inkstands, and a number of articles which are used for decoration and for domestic and other useful purposes. But the most important of all are the famous glazed tiles to be seen all over Sind. These tiles are used for roofing, flooring and for wall decoration. The patterns are purely oriental, uncontaminated by European taste. The process of colouring is kept a family secret, and is handed down from generation to generation. But there is, however, a deterioration in the execution of the work. The glaze is not so lasting. One great defect of the Sind glazed pottery is that the clay is not sufficiently hardened and is porous and consequently it is not so useful. If the artisan can learn how to harden the clay, it will be a great step towards finding a very good market for this industry in India as well as in European countries. The clay used is the ordinary one and so utensils and jugs made of it are very

brittle and consequently the pottery cannot serve the purposes of stoneware or chinaware. It is not that we have not a better kind of clay. We have plenty of it, but it is not to be found in the centres where glazed pottery has been localized. The potters have not had the advantage of the white clay and have not tried it. Our Sind potters are too lethargic even to think of procuring the superior clay and experimenting with it. Suggestions have been made to them and inducements offered for such experiments, but their conservatism simply does not allow them to take advantage of them and they go on working in the old grooves. It is to be hoped that this conservatism may yet be overcome, and that the Sind potter may some day profit by the recent improvements in the art.

II.—*Lacquer Ware.*

The next important art industry is that of lacquered ware. This industry is localised in two villages in Sind, Khanot in Hyderabad District and Kashmore in Upper Sind Frontier District. Recently the work is being done by some Technical Schools in Sind and in the Khairpur State. The best and most artistic ware is, however, produced in the village of Khanote, which is about three miles from Hala. This village contains about 15 families of turners, who lead a hand to mouth existence. The most important and marketable articles of their produce are the famous cradles—not the baby cradles but the big ones—which have come to be a necessary piece of furniture of almost every rich and middle class family in the province. They cost each from Rs. 30 to Rs. 700 and afford a very large scope for a display of artistic workmanship. The turners of Khanot also produce a variety of articles for household decoration, such as flowerstands, circular boxes (Ganj), chairs, spinning wheels, toys, rulers, etc. The lacquer work is done mostly on wood, but in one part of the province on the frontier, some workmen have been able to produce beautiful specimens of it on pottery and on glass. Our lacquer ware is superior to any found in different parts of India, so far as colours and designs are concerned. In glaze, however, Sawantwadi ware beats it. I wish our workmen could imitate that glass. For the last three or four years the industry was in a bad way owing to an

abnormal rise in the price of lac. It is to be hoped that with the present fall in price of that article, there will be a slight impetus given to this ancient industry. It is a matter of regret that this industry is also languishing partly from want of organisation and partly because of the unbusinesslike habits of the workmen.

III.—*Cloth Printings.*

The printings of Sind are very much appreciated by foreigners. Almost every town and village of importance has its printers—called *Khalis*. The costumes of the Sind ladies—both Mahomedan and Hindu—as also of Sind Mahomedan gentlemen require much of dyeing and printing to be done. There is a number of articles of apparel on which the printer can exercise his skill and display the beauty of his patterns. The gowns of both Hindu and Mahomedan ladies have to be printed. Mahomedan women cover their bodies in printed sheets and Mahomedan men generally carry printed scarfs with them. Apart from clothes, printers make a number of other articles, *e. g.*, shamianahs, table cloth, quilt-covers, saris, bed-covers, etc. It is a pity that the printers have left off the natural vegetable colours and have taken to foreign dyes. Still the effect and the designs of the prints are purely oriental. The industry is in a decadent condition. The cheap British prints in gaudy and attractive patterns are slowly and steadily replacing the indigenous genuine articles and the time is not far off when the printing industry will be only a minor industry of the province.

IV.—*Embroidery.*

The silk and gold thread embroidery of Sind was at one time famous throughout India, but is gradually losing its former place of honour. Only 20 years ago there were as many as about 100 men hard at work in Hyderabad alone, making embroidered table-cloths, caps, slippers, coats, etc., etc., to supply the enormous demand local and foreign. To-day there are hardly a dozen. The change is due to the cheap and showy embroideries of other places having ousted the costly but real and lasting articles of Sind embroidery. To some extent the change of fashions and tastes has consi-

derably diminished the demand for this industry. So much for the embroidery made by males. The females' embroidery is peculiar to each district. The gold thread and silk embroidery of Hyderabad district, the rough silk embroidery of Thar and Parkar, and the cotton thread embroidery of Thatta and Shikarpur are all appreciated by foreigners and find a ready sale in European markets.

In Sind we have beautiful embroidery worked on leather. The leather *nals* serve the purpose of carpets and are very lasting. Besides these, the other embroidered leather articles are used in the harness of horses and camels.

I may mention here that at the Ahmedabad Exhibition the Sind section displayed some pictures worked in embroidery which were greatly admired for the exactness of the portraits.

V.—Hand-loom Weaving.

Hand-loom weaving is a very important industry of Sind. Every town and village has a number of weavers who ply their shuttle in the primitive method. There are two villages—Thatta and Nasarpur—the cotton fabrics of which places are famous throughout Sind. The great specialities of these places, the famous coverlets (*khess*) in geometrical patterns—costing from 5 to 100 rupees are so strong and durable that they will last a life time. The striped cloth of these places—called *susis* and *garbis*—are used for trousers by the rich and the poor of the province alike. It speaks not a little in favour of our fabrics that we secured a silver medal at Ahmedabad, the centre of cotton manufacture. The silk fabrics of Thatta—known as *loongis*, which are peculiar to Sind alone—are used as turbans by Mahomedans. A *loongi* would cost from 5 to 50 rupees. It is a pity that these beautiful products of the province are going out of fashion, and are being replaced by the cheaper and worthless products of the Manchester looms. The minor hand-loom products are *mushroos*, a mixture of silk and cotton cloth which will compare favourably with any produced in other parts of India. We have also waist-bands, which are produced in innumerable patterns and which are very durable.

The hand-loom industry owing to the keen competition

with Manchester goods is dwindling away in Sind as in other parts of India. As the *Swadeshi* wave has hardly touched our province, it has received no impetus as in other provinces. I am glad to note, however, that some of our educated men are introducing new hand-loom. But want of experience stands in the way of great success. One or two concerns in Upper Sind are turning out beautiful work in cotton, wool and silk and promise to come up to the level of other indigenous products of the country. Finding the Indian loom not up to the mark one or two firms have imported foreign hand-loom and are working on them. A Shikarpur firm and the Khairpur State authorities are working on Hattersley's looms. Local men have now learnt to handle and to repair them easily.

The indigenous loom is primitive. The outturn, therefore, is not at all profitable. It requires great improvement. A wholesale change is not desirable, it will quite do if the automatic shuttle arrangement is introduced in the primitive machine. Our villagers will not be able to repair the new hand-loom, even if they could manage to buy it. Hence it is best to make only the necessary reform in the native loom, so that the weaver may earn good wages.

We have a number of ginning factories but up to now we have had no cotton spinning and weaving mills, though Sind has been producing and exporting a good deal of cotton. With the prospect of Sind Egyptian cotton being acclimatized, there is a stir among our men to erect some mills in Sind. Just now there are three or four proposals for starting such mills in our province. One or two prospectuses have been issued and shares are being subscribed. It is hoped that in the near future Sind will have its mills as other cotton-growing parts of the Presidency. It is, however, necessary to strike a note of warning against the establishment of too many mills at one and the same time in our province, where none has existed till now. A mill or two will quite do for the present. Others may be started after the first ones have been successfully established.

VI.—*Carpets.*

The Sind woollen and cotton carpets and rugs are strong

and used throughout the province. They are cheap and very durable. The industry is, however, languishing because people are taking to the cheaper and more showy importations from European markets. Recently a well equipped carpet factory was established in Khairpur which turned out very good carpets. The Hyderabad and Sukkur jails are producing very good patterns and durable ware. Nor should I omit to mention the very strong camel hair rugs of Thar and of the mountain tribes of Kohistan and Baluchistan which are famous throughout the province for their wonderful durability. The work is done in Sind and on the frontier by the women during their leisure hours. It is very desirable that this industry is put on a sound commercial basis.

VII.—*Sugar-cane Industry.*

Our province produces a large quantity of sugar-cane. The Upper Sind cane is much superior to the Lower Sind one, the former being softer and sweeter, but it is grown only for eating purposes. In Lower Sind we have many sugar plantations and there are sugar-cane crushing machines, but these are, as our other indigenous machines, primitive, and these produce only molasses. No attempt has yet been made to manufacture sugar. An enterprising firm may find in this industry a good and profitable investment. Sugar-producing plant does not cost much, so the work can easily be taken up by any intelligent, energetic man.

VIII.—*Mat and Reed Work.*

This small industry extends through different parts of the province. Several kinds of mats are made. But the Bubak mats and reed works deserve special notice. The mats are thick and cheap and can be profitably used by the inhabitants of the Presidency proper, who usually sleep not on cots but on the floor. The reed work consists of trays, baskets and other useful domestic articles.

IX.—*Leather.*

Sind is one of the provinces which exports a very large quantity of raw hides and skins to foreign parts. In the year 1905-06, 66,441 maunds of these worth Rs 18,58,812 were exported to foreign parts. In the year 1906-07 nearly

50 lakhs of skins and hides, weighing 130 thousands cwts. worth about Rs. 1,09,33,836 were exported from Sind and Upper India, *via* Karachi. Hyderabad forms the centre of the leather trade in Sind. From all parts of the province hides and skins are brought to Hyderabad where they are cured. A very small portion is retained, but the bulk is exported to England and America. In the vicinity of Hyderabad is situated a village inhabited only by low class people called *Kalals* and *Fatias* numbering about 1000 men, women and children, whose sole occupation is to deal in leather. They cure hides and skins and sell them to the agents of European firms. Sind hides are also sent to Cawnpore and Madras where they are tanned. The curing of skins and hides in Sind is done in the most primitive way. There are two well equipped tanneries in Hyderabad which employ about 50 to 60 men, and these are doing good business in curing skins alone. What is wanted is a technical school in the locality itself where the children of these low class people could be taught up to date methods of curing and tanning leather. It should not be on the model of ordinary technical schools, the sole purpose of which is considered by the authorities to be to train the eye and the hand of the student and not to turn out trained artisans who can earn their livelihood on their finishing the course. But it should be on the lines of those foreign institutions which produce well-equipped workmen ready to enter the world. Considering the fact that Sind exports a very large quantity of raw hides and skins, I would very much like to see an enterprising firm establish an up-to-date tannery and a boot and shoe factory somewhere near Hyderabad (Sind), where it will find ample raw material for the manufacture of leather goods.

* * *

Leather is not the only raw material which is exported from Sind to foreign countries. Wheat, cotton-seeds, animal bones, wool, indigo, lac and many other articles produced in Sind and Upper India are exported in large quantities from Karachi and other Sind ports, as the following figures will show :—

- (1) Wheat—1,54,34,060 cwts., worth Rs. 6,05,59,421—
(the largest quantity having been exported in the year

1904-05] when the figures rose to 2,83,80,715 cwts. worth Rs. 11,92,44,927).

- (2) Cotton—7,98,130 cwts., worth Rs. 2,33,45,329.
- (3) Seeds—10,17,965 cwts., worth Rs. 6,15,06,470.
- (4) Animal bones—22,306 tons, worth Rs. 12,02,867.
- (5) Wool—2,17,61,735 lbs., worth Rs. 1,13,20,034.
- (6) Indigo—about 2,500 cwts., worth Rs. 2,66,068.
- (7) Lac—1,337 cwts., worth Rs. 1,33,180.

If these could be retained in the country and worked into local manufactures, India will be richer for it.

Minor Industry.—There are several minor industries of the province of which I need name only a few, for instance, the ivory work of Hyderabad and of Tatta, the inlaid work, the enamel industry and the sword manufactory. All these are almost dead. I may here mention that two firms in Hyderabad (Sind) have produced enamel for work on gold and silver which has been pronounced to be in no way inferior to the stuff found elsewhere.

I should not omit to mention our fish curing industry. It is in its infancy, but if properly handled it has a good future before it. We have several kinds of fish peculiar to the province, especially the *pulla*-fish. If these can be properly preserved and exported, they will be able to secure a good market.

It will not be out of place to mention here that our province produces a large quantity of dates, which are eaten fresh. No attempt has been made to preserve them. For such dates we have to depend upon Persia and Arabia. A small industry could be started for preserving dates or for extracting sugar therefrom.

Agriculture.—So far I have been speaking of the arts and industries of Sind; but, as elsewhere in India, agriculture is the mainstay of the province. Here I have not to strike a note of despondency but of great hope. For agriculture we have not to depend, as you do, on unreliable and irregular rains but on the steady supply of irrigation water from the great, beneficent Indus. Ordinarily we get a good supply and so we are not at the mercy of the rains. This year, however, the water in the river was very low and the result was a poor crop. This in

the opinion of some, is due to the water of the great river having been tapped in the Panjab. For providing against such contingencies, Government is arranging to erect a weir at Sukkur and two canals on the two sides of the Indus, which will supply us water perennially. Our chief products are *jowari*, *bajri*, rice, tobacco, indigo, oil seeds, pulses, wheat, cotton—Sind and Egyptian—, and sugar-cane. As I have shown above, a large quantity of these is exported leaving the local peasantry without a sufficiency of the necessities of life. At present the supply of water in several districts of Sind is limited to one season. In the Jamrao District, however, it is perennial and there experiments in Egyptian cotton are being carried on very successfully. I do not agree with the Hon. Mr. Muir Mackenzie and Dr. Mann, the Principal of the Poona Agricultural College, when they say that the Sindi is not capable of extending this cultivation and, therefore, suggest that some of the Gujarathis should go over to Sind to grow Egyptian cotton according to scientific methods. I do not grudge the Gujarathis a little exploitation of our soil; it is, however, but fair that we, the residents of the province itself, should be given a chance. We should receive the same inducements that are being offered to the outsiders.

With a good supply of Egyptian cotton, we are sure to see in our midst tall chimneys by the dozen. As I have said above, there is already an attempt in that direction.

We have to thank Government for establishing an experimental farm in Sind. But a single one is not at all sufficient, as climate and other conditions are different in different parts of Sind. We require several District and Taluka farms in order to reach the cultivator. Strangely enough Government has been encouraging uneducated, unintelligent and unenterprising landholders but not the educated go-a-head capitalists. In one notable case, where Government has departed from its mistaken policy, remarkable success has been achieved and it may be hoped that this will lead the authorities to lend the same encouragement to other capable men, as they have extended to Professor S. C. Shahani, the gentleman referred to.

Conclusion.—I have now dealt with both the agricultural and art-industries of Sind. I have described the situation as regards the one as well as the other. To put the whole matter

in a nut-shell we are not at present doing well at all. But there is no earthly reason, why we should not, in spite of our difficulties, be able to advance to a position of honour among the many provinces which comprise this great country. If we have difficulties to contend against, we also possess certain special advantages. And God helping, we will arise and avail ourselves of the opportunities that lie before us, and make the land of sacred Sind smile with prosperity.

THE SUGAR INDUSTRY.

By C. GOPAL MENON, Esq., F.S.A., etc.,

Madras.

The purpose of this paper is to describe the sugar question as it is at present. Sugar has now become the cheapest of all luxuries. It is considered as a necessary of life even by the poorest in almost all parts of the globe, but was a substance unknown to the classical nations of antiquity. Formerly chemists called everything which had a sweet taste, sugar, but the term, later on, came to be restricted to the sweet ingredients in vegetable and animal juices. Until 1619, only cane sugar was known as a pure substance, but in 1747, a German chemist discovered that many roots contained sugar, especially the beet-root.

Cane sugar was originally a product of Eastern Asia (Indo-China and the valley of the Ganges). The cane and the mode of extracting sugar from it, were introduced by the Arabs first into Egypt, and then, in the ninth century, into Crete, Sicily, and the other islands of the Mediterranean. At the present day, the cane is cultivated all over the tropical and many sub-tropical countries. In India, the production is three times as much as that of Cuba. Of the cane-producing countries which have developed independently of artificial stimulus Java stands foremost.

The cultivation of sugar-cane is easier than its modern rival sugar-beet. Sugar-cane is a tall plant growing from ten to fifteen feet; and the stalks attain a thickness of an inch. The stalks are cut down yearly before flowering, but the root stock is perennial, and continues to throw up every year

fresh shoots which are sufficiently remunerative for 30 years. Not only has sugar-cane this advantage over its modern rival sugar-beet, but it also surpasses the latter in the easy culture and in the amount of sugary juice obtained from a certain quantity of raw material as well as in the relative amount of sugar capable of being got from the juice. Sugar-cane cultivation demands hardly any attention, but beet suffers under the disadvantage of requiring very high cultivation. The plant must be replanted year by year. It, however, yields a refuse material of much higher value than sugar-cane, known as beet-pulp, which is used as fodder for cattle.

Although the fact that beet-root contained sugar was made known to the world in 1747, no efforts were made to establish factories in France and Germany until 1801 to extract sugar from beet. In this year a few factories were established but the attempt did not prove successful on account of the heavy expenses of extraction and the movement met with little success as a commercial venture. In 1810, however, attention was again directed to beet-roots owing to the English blockade of European ports, which prevented West Indian sugar from entering France. Napoleon placed at the disposal of the Minister of Agriculture 100,000 acres of land free of all taxes for the cultivation of beet-root and this may perhaps be said to be the beginning of bounties.

In 1829 France had 100 factories producing only 5,000 tons of sugar, about a fortnight's production for a single big factory to-day. At this time France was in every way going ahead of Germany in industrial improvements. In 1836 France had 436 factories making 49,000 tons of sugar.

Coming to more recent times the date of the bounty war may be considered to have its origin about 1871, after the Franco-Prussian war, when Germany began to make real industrial progress. In 1870 France manufactured 290,000 tons of sugar against Germany's 186,000 tons. Thanks to the wise statesmanship of German legislators in the direction of industrial improvement, Germany began to flourish and to day her production of beet-sugar is 2,300,000 tons against 1,150,000 tons made in France. Some people will say that this marvellous result was brought about by "bounties" but this is not the whole truth.

The real reason for this remarkable success of Germany may be traced to the magnificent soil of the Elbe valley, similar to the very best soils of France ; the establishment of large factories, the use of diffusion instead of presses, selection of roots for quality, great care in cultivation and bringing in the roots, use of manures, great care and scientific study in manufacture and cheapness of field labour. These are the main reasons which caused Germany to advance over her continental rivals.

On account of the care bestowed on cultivation combined with the help received from the Government of Germany in the shape of bounties, the price of sugar fell down in 1884-5 from 16s. to 10s. and the other continental countries, especially France, began to cry out that they should have bounties as in Germany, whereupon the Act of 1884 was passed and framed in such a way that the manufacturer obtained great advantage in producing a rich root. The Germans did not take any notice of this law of 1884 but, on the contrary, in pursuance of their original policy, they reduced their bounties which in 1887 were valued at 4 marks 90 per 100 kilos of exported sugar to 2 marks 12, which remained in force until 1892. She went on encouraging production in such a manner that the effect of bounties in forcing the production regardless of consumption made itself felt, and another crisis came in 1895 when the price fell to 8s. 6d. for raw sugar f.o.b. Hamburg. The voice of the powerful land-owning class in Germany made itself heard, and after maintaining the law of 1894 for another year they doubled their direct bounty on raw sugar.

France took this as a challenge and the new bounty of Germany was looked upon by France as a menace to oust her from the foreign markets. France immediately brought pressure to bear upon her Government and the law of 1897 was passed, giving obvious advantages in the shape of bounty for export on sugar. This action on the part of the French Government only made Germany strengthen herself, and the formation of the German Cartel or Trust was the result.

I have briefly traced the circumstances that led Continental Europe to adopt bounties in order to strengthen the manufacture of sugar there, but in trying to do this each

country began to crush each other down. The rivalry became so great that it was found necessary in 1898 to call an International Conference at Brussels, which defined bounty as the advantage granted to manufacturers and refiners by Governmental fiscal laws, and supported directly or indirectly by the State Treasury. The legislation on sugar in the different countries of Europe has the common features of (1) pushing production, (2) limiting home consumption and (3) promoting foreign consumption.

Several conferences were held in order to come to a mutual understanding among the various continental countries for the abolition of bounties, but it was not until the 5th March 1902 that they were able to come to any definite settlement. The Convention signed at Brussels abolishes all bounties direct and indirect from the 1st September 1903, and reduces to a uniform rate of 6 fcs. per hundred kilos the high protective tariffs which alone in Germany and Austria made the formation of Cartels possible.

It is pointed out that, by abolishing bounties, the Convention had restored the natural conditions of trade, and placed cane and beet sugar on a fiscal equality.

The large imports of Austrian and German sugar into India, encouraged by low Austrian Lloyd freights, had raised the question of indirect bounties in its most acute and subtle form. The main object of the Continental countries is only to secure a market for their products at the expense of other sources of supply. Since the creation of bounties, India began to import beet sugar in considerable quantities. India is the home of the sugar-cane. Sugar, like salt, is of universal consumption among the people of India, and may indeed be called a necessity of life with them. Sugar can be produced so cheap in India, that in the course of his writings, Dr. Royle thought it might even be possible to use it for manure in less favoured lands. India might with advantage supply the whole world with sugar, but it appears singular that she cannot produce enough even for her own requirements. India's export trade in raw sugar was once of considerable importance. Uneconomical methods of production coupled with the large importation of bounty-fed beet-sugar from Europe have crippled this once great export trade. Exactly how much

India consumes of this article it is difficult to gauge, but the importation for 1906-7 was 486,000 tons. Probably this is not even a fraction of what the cane sugar could yield in India if scientifically dealt with, as there are at the present day about 4,000 square miles devoted to sugar-cane cultivation every year. Prior to the importation of beet-sugar, the annual average for the ten years was 4,400 square miles. The total importations of sugar from different sources for the past three years are 309,600 tons in 1904-5, 374,000 in 1905-6, and 486,000 in 1906-7. The sources of supply of cane-sugar are Java, Mauritius and the Straits and of beet Germany, Austria-Hungary and the United Kingdom.

It might well be asked why India being the home of cane and it having a soil or climate well suited to the industry combined with a great supply of cheap labour, she should be under the necessity of importing this article from foreign countries. If this industry is encouraged, India will not only save the profit on sugar imported for consumption, but she would, after manufacturing enough for her own requirements, also be able to turn out sufficient for exporting abroad.

On glancing through the import schedules of different ports of India, we observe that the import of sugar has enormously increased in the last 25 years. Until 1895, Mauritius supplied the bulk of India's demands. In 1894, when all articles of import were taxed in India, an import duty of 5 per cent. was levied on sugar. The planters of Mauritius declared that on account of this duty, the importation of sugar from their colony would cease; but no immediate decline was observed in the imports from Mauritius and Java, although China and the Straits suffered a little. It was not owing to this new tariff that the above Colonies were unable to compete with the Continental sugar in the Indian market, but it was the production of beet-sugar at a diminishing cost in Germany and Austria-Hungary, combined with the reduction of freight by German lines of steamers and the State aid given to the German and Austro-Hungarian manufacturers and refiners of sugar.

The cane-sugar refiners in the West Indies, Mauritius and India, seeing that it is impossible to compete with beet-sugar,

made representations to the Imperial Government to take action to check this unfair competition. Just about this time, Germany and Austria were shut out from the markets of the United States owing to the imposition of countervailing duties under the Dingley tariff. On account of this legislation in the United States, a heavy stock of sugar was left over in these two countries, which was shipped to India, and the Indian markets were overstocked with Continental sugar. The Indian Government, therefore, found it necessary to resort to legislation and in March 1899, a countervailing duty was imposed to the extent of the bounty granted in these countries from where the sugar was exported. Naturally the import of sugar from these countries fell to a great extent, but a few months later, affairs resumed their old course, and thus the objects for which countervailing duties were imposed proved ineffectual. It was certainly a puzzle to specialists in this trade—the course the market had taken. The investigations of the Brussels Conference proved beyond doubt the fact that the competition of the foreign sugar in Indian markets, was due to the additional bounties enjoyed by the German and Austrian sugar under the Cartel system. The Indian Government again passed legislation on the 23rd May 1902, imposing extra duties on Continental sugar to counteract the indirect bounties.

I have now described in detail the evil effects brought on the sugar industry of India by the existence of duties in the shape of Bounties and Cartels on the continent. The pity of it is that while in Continental Europe the scientific cultivation and treatment of beet-root has been revolutionising the industry, practically no improvement has been made in the land where the best sugar might be produced in the largest quantities and at the lowest cost. Even in places like Hawaii, the yield per acre has been brought up to nine tons, while in India it remains at one ton or less—three million acres producing only two and a half million tons of sugar, of such inferiority that British refiners will not look at it. The sugar crop might without difficulty be increased in India, and in a short time an yield of three tons per acre could be easily obtained.

It is discouraging that in a country where sufficient faci-

lities exist for the production of sugar-cane and the manufacture of sugar from it, practically no serious attention is given to this important industry. In India there are a few European sugar factories, for instance, the Rosa works at Shahjahanpore, at Cossipore in the suburbs of Calcutta, at Aska, Nellikuppam, and Goribidnur. Some of these are not doing much work, and generally the manufacture is roughly and wastefully conducted ; improvement both in the extraction of juice from the cane, and in the conversion of juice into sugar is greatly needed.

What is wanted is close attention on the part of the Agricultural Department to the system of cultivation of sugar-cane, to the raising of new varieties of sugar-cane capable of withstanding diseases, and standard varieties capable of producing a larger yield of sugar per acre. Special classes and lectures about sugar-cane cultivation should be organised, and attached to these an experimental farm must also be opened. Of course, the Agricultural Colleges which are opened in several places in India will deal with the subject exhaustively and scientifically, but in addition to this, there is ample room and necessity for the operation of a few model farms in important places in India. A number of model sugar refining stations are also required in the chief centres where sugar-cane can be obtained freely. People in the country can do a great deal ; they should cooperate and try to open small sugar refining factories under the auspices of the Agricultural Associations that are started. When a number of small mills is opened in the country in the same manner as in Java, Mauritius and other places, there will, in course of time, be sufficient supply of sugar and the large import of this article of necessity will be stopped to a great extent. When a net-work of sugar factories is thus established, the problem we have been considering will have been solved. The outlay required to set up a small factory will not be more than Rs. 50,000 to 60,000. When an industry is in its infant stage, efforts should be made to start a number of small factories rather than one or two large factories. The object of those who take an interest in this branch of industry should be to study the cultivation of sugar-cane, and to find out the standard varieties capable of producing a larger yield of sugar.

cane per acre ; experiments should be made in testing the relative values of manures, in the chemical selection of sugarcane, in the treatment of cane-tops with germicides and such other directions as will conduce to the increased production of this article. There will, undoubtedly, be a striking result. Efforts should be made to put up factories with the help of experts, such as Mr. A. E. Jordan of Waltair, for the selection of machinery of economical working, and get them into complete working order. The Director-General of Commercial Intelligence may also be consulted, and he will, I feel sure, be glad to furnish the public with any information that would be required.

SPEECHES ON RESOLUTIONS.

I.—INDUSTRIAL SURVEY.

SIR BHALCHANDRA KRISHNA, *Kt.* (Bombay), in moving the first proposition said :—

Mr. President, Ladies and Gentlemen,—The proposition which has been entrusted to me runs thus :—

“That this Conference expresses its sense of satisfaction that an Industrial Survey has been carried out in the United Provinces and is being carried out in the Central Provinces and in the Baroda State ; and it would urge other Provincial Governments in British India and the Governments of other Indian States to carry out at an early date Industrial Surveys of the territories within their jurisdiction, as exact and detailed information would afford facilities for the introduction of a sound system of Technical Education and the well ordered development of indigenous industries.”

Last year this proposition was passed in a modified form, and as a result of that, a memorial was submitted by the then President of the Conference and the General Secretary, and the outcome of that petition is, that in addition to those which have been mentioned, *viz.*, the United Provinces, the Central Provinces and Berar, and the Baroda State, other Governments also have taken up the question. The Bombay Government which was very backward in this respect has, I am glad to say, also considered the question, and they are very soon likely to undertake the survey of the whole province, and so also in the case of Burma and other parts. The Bengal Government is not quite prepared for it, but we are hopeful that they also will do so shortly. But I think when we have got such a survey, then it will be quite easy for the General Secretary to take up the question in an earnest manner to show to the different Associations all the steps they should take with regard to technical education. With these observations I beg to propose this resolution. (*Cheers.*)

Mr. K. NATARAJAN (Bombay), in seconding the resolution said :—

Mr. President and Gentlemen,—I beg to second this resolution. The other day His Excellency the Governor of Bombay said that one thing indispensable in India is an idea of purity in a vast mass of writing. This idea of industrial survey is such, and the Government seems to have forgotten that the idea originated with itself, and to think that it had its origin with lawyers and schoolmasters. The idea owes its origin to Government itself. As to the necessity of the survey, it has been amply demonstrated in the memorial which my friends the Hon'ble Mr. Vithaldas and Mr. Mudholkar recently submitted to Government and those who say that they have all the knowledge and there is no necessity for carrying out such a survey, only show how ignorant they are. If they had all the knowledge required, why are the indigenous industries in their present condition? I do not think there is any necessity of urging the reasonableness of this scheme. The United Provinces Government declared sometime ago its usefulness, and I am sure all Provincial Governments sooner or later will take the same view. Gentlemen, when the next Conference meets I am sure you will have to pass the resolution thanking all Governments for making the Industrial Survey. (*Cheers.*)

The President then put the resolution to vote and it was carried unanimously.

II. TECHNICAL AND COMMERCIAL EDUCATION.

Mr. R. C. WHITENACK (Baroda) moved the second resolution which runs as follows :—

“(a) That this Conference reaffirms the resolution on Technical and Commercial education passed at the last Conference.

“(b) That this Conference thanks the Government of the United Provinces for the action taken by them with a view to introduce a fairly comprehensive system of Technical Education in those Provinces and would express the hope that other Provincial Governments will be pleased to convene representative Conferences such as the recent Naini Tal Conference to devise measures for the spread of Technical Education in their respective provinces. And this Conference further expresses the hope that the Government of India would provide adequate funds for giving effect to the recommendations of the

Naini Tal Conference and carrying out similar schemes in other provinces.

“(c) That this Conference, while appreciating the action taken by the Governments of some Indian States to encourage Technical Education, urges that further steps should be taken in the same direction in all Indian States.

“(d) That this Conference welcomes the growth of public interest in Technical Education as shown by the action taken by several local and municipal boards and private associations in promoting it, and it strongly urges on the leaders of the people the necessity of taking practical steps for providing increased facilities for it by starting institutions and founding scholarships to encourage technical studies in India and abroad.”

Mr. Whitenack said :—Mr. Chairman and Gentlemen,—Of the efforts which I have been making with the assistance of His Highness the Gaekwar (*cheers*) to further the development of industries of all kinds, it may be of interest to know that His Highness has sanctioned a scheme which will enable the financiers of the state to organise a large commercial bank which will bring money easily to the people of the whole of Gujarat. His Highness has recently added to the Kala-Bhavan a course in chrome dyeing and we have recently ordered from Germany some machinery for the installation of this additional course. His Highness has ordered an industrial and economic survey of the state to be made for his personal information, and for the information of his officers, so that they may adopt measures to improve the economic condition of his people. But my topic is commercial and technical education. The subject has been very ably discussed by Professor Gajjar. He has made some very true and forcible remarks concerning the general nature, and methods to be adopted in furthering the cause of education. But the subject is one that might give rise to prolonged oratory. It is one that appeals to every sensible man, and I am sure that I need not remind you that it is the high development of commercial and technical education in countries like America and Germany which, combined with their fiscal policy has enabled them to achieve in a comparatively short space of time, the wonderful advance which they have made

in commercial and industrial work. There are just a few suggestions that I wish to make with regard to the question. A foreigner coming to this country is convinced within a short space of time that an average Indian artisan is lacking in that carefulness and devotion to method which characterises the artisans of Germany, England, America and other commercial countries. I would suggest that technical education should commence with manual training. There ought to be universal spread of manual training in the primary classes. I do not know whether it would be better on the part of the people of India to wait until the Government of India deem it fit to spread the facilities. It seems to me that the people of this country might do more, independently of the operations of Government. A great deal more might be done by the people of India themselves than by the operations of Government to further the cause of manual training and commercial and industrial education. We have in this part of the country a good technical school and trade school—we have it at Baroda,—and a great deal more might be done in that direction than is being done, if the communities independently of Government should, throughout the country, turn their benevolent instincts to the endowment of such schools. The Government will in time turn its attention more adequately than it has yet done to the development of technical institutions where men may be trained for mechanical engineering, electrical engineering and metallurgy. But apart from the efforts which Government will probably make in this direction, it seems to me that the communities in large provinces, and the people of all the cities of this country ought to find some way of raising the funds for the development of these trade classes.

Gentlemen, we shall have the Tata Research Institute—an excellent institution for the increase of knowledge—for adding to the sum of knowledge and for original research. But between the trade classes which now exist and the Research Institute which will be developed under the late Mr. Tata's scheme (*cheers*), there ought to be other institutions for the development of technical education. Therefore I think that this resolution is placed before us, that Government should be moved in every province to assist in the develop-

ment of technical education, and I have great pleasure in commending it for your acceptance. (*Loud Cheers.*)

Mr. D. G. DALVI (Bombay) in seconding this resolution said :—

Mr. President, Ladies and Gentlemen,— My principal excuse in venturing to offer a few observations in seconding this comprehensive proposition is that I have been specially asked to make an explanatory reference to the Naini Tal Conference and the lessons to be learnt therefrom. The subject of technical education has made rapid strides in recent years to win its way into the arena of practical politics, and no small share of the credit must be given to the deep hold the new Swadeshi movement has obtained on the people and also on the Government. Those who have looked carefully into the history of education in this country will remember that but a quarter of a century ago, it had no place in the educational system of the land. The celebrated Education Commission's Report contains no reference to it. Last year, the Government of India published an excellent volume containing the important official documents, both imperial and provincial, on the subject. On perusing them, you will find that, in the memorandum addressed by Sir A. MacDonnell in 1886 to the local Governments, he observes that Government had done nothing to carry out their intention to impart technical instruction before the early eighties of the last century. " Since then, however," he continues, " things have changed. The supply of Government service has far outrun the demand. The bar, the medical and engineering professions absorb a small portion even of our University graduates. Our schools and colleges are yearly adding to the crowd of young men whom our system of education has rendered discontented with their sphere of life, to which they were born, without fitting them for any other." This pressing need for industrial and scientific training has been still left unsatisfied in the last two decades, the provincial Governments have published various schemes on paper, and the Government of India have issued reports and resolutions or recommendations submitted by committees and conferences, but as far as actual progress is concerned it must be unwillingly admitted, we are just where we were.

The various schemes may be viewed in two groups ; one which requires a bifurcation of studies, either at the end of the primary or the secondary course, towards some technical pursuit, thus combining literary with industrial training ; the other requires a thorough overhauling of the present system of education with the object of incorporating more of practical work from the commencement upwards. There is also a third school which says that industrial training should not be given in schools at all, but that students must be attached to various workshops and factories as probationers, and that the State should render what help it can for the purpose. However it may be, we have not yet emerged out of the stage of deliberation to be ready for action. No doubt the State has increased the number of technical scholarships for study abroad, added to the number of industrial and agricultural schools and so on ; but the efforts are meagre and wanting in system and uniformity, and the grants annually given for the purpose are so poor that unless they are increased considerably absolutely no progress can be made in the immediate future.

Better times appear, however, to be dawning in the United Provinces. The energetic Lieutenant-Governor of those Provinces has been endeavouring to carry out some of the views he expressed as the head of the Department of Commerce and Industry at Calcutta. You will remember the resolution issued by Lord Curzon's Government on technical education in which Sir John Hewett had a hand. The local Governments were called upon to submit practical recommendations based upon the principles enunciated in this resolution. Early last year a member of the Madras Legislative Council asked the Government what recommendations were submitted. The answer was that some recommendations were sent up which the Government was not ready to disclose. Some months after the same member again inquired in the matter, and the answer was that, as a result of considerable correspondence, the recommendations made by the Madras Government were rejected by the Imperial Government. Sir John Hewett, Lieutenant-Governor of the United Provinces, has adopted a different policy. He called a Conference at Naini Tal for the purpose

of discussing the whole question. About thirty gentlemen, the majority of whom were non-officials, including our friends Pandit Madan Mohan and Babu Ganga Prasad, were invited to the Conference. As a result of their deliberations lasting for 11 days, they succeeded in adopting a scheme for the industrial development of the Provinces. The recommendations so adopted are, we are proud to observe, in complete accord with the resolutions proposed from this platform from year to year. They have been, we understand, approved by the Government of India and are now awaiting the sanction of the Secretary of State.

The different treatment meted out to the recommendations of the Madras and the United Provinces Government affords the best justification for holding such Conferences in each Province, in order to take the non-official public into confidence, and bring the official measures in a line with popular feelings and requirements ; and hence this Conference urges the other local Governments to take such steps.

I shall offer only one observation on the third part of the resolution before I close. The excellent technical institutes in Baroda and Mysore are known to us all. To the list of such noble attempts made by our benevolent Indian chiefs we shall, in the course of this year, add one more. I am not making a startling revelation when I say that H. H. the Thakore Saheb of Morvi has offered a substantial sum of several lakhs for establishing a technical institute in his State, and the fact that its inauguration and management rest in the hands of such an able scientist as Professor Gajjar, the Chairman of our Committee, and a level-headed, practical worker like Mr. S. N. Pandit of Rajkote, is a guarantee that it will soon be a model institution of the kind. With these words I commend the resolution for your acceptance. (*Cheers.*)

MR. ISHWARDAS VARSHINI (Aligarh) supported the resolution.

PROFESSOR RUCHI RAM (Lahore), in further supporting the resolution, said :—

Mr. President and Gentlemen,— I have great pleasure in supporting this resolution, and in doing so I shall make one or two observations as to what has been done in the Punjab as regards commercial and technical education. It was one

or two years ago that an Industrial Committee was appointed by the Government of India and the Committee came to the Punjab and met for six or seven days. I was invited to be present at the Committee, and therefore I had some knowledge of that Committee. I was invited there by the Director of Public Instruction. The Committee met from day to day for five or six days. Opinions were invited from the Inspectors of Schools and all those who were in any way competent to give opinions in matters like these. Finally the Committee came to the conclusion that five industrial schools should be established in the Punjab, *viz.*, one at Ludhiana and the rest at some other important places in the Province. Well, gentlemen, that was the recommendation of the Committee at the time. Now, five or six years have gone by, and we do not know what has been done with that report, and we also do not know what has been done with the recommendations of that Committee. (*Shame.*) But, gentlemen, I am sure that no school has been opened. Again, two years ago, a Conference was arranged by the Punjab Government. I received a Circular from the Director of Public Instruction to that effect. The Conference was called specially to revise the studies of schools and institutes of commerce. I had the honour of being one of the three Indian members of that conference.

This Conference met for five or six days and went over the synopsis of studies of the institutes of commerce, and also went through some of the work which was done in such institutes in other parts of the world and it suggested a scheme of studies. But, gentlemen, I am sorry to say that nothing has come out of that and I think it is high time now to induce Government to put a little more energy into the business and to start industrial and technical schools and schools for teaching commercial subjects. I do not wish, gentlemen, to take more of your time. I only wish to say that, so far as we in the Punjab are concerned, we have no such thing as technical or commercial education. It is something that is unknown to us. In the report of the Educational Department there is a chapter on technical education ; but to us technical education means the study of law as a branch of technical education : and there is a School of Art and Industry, but it is more of fine arts and drawing and free-hand drawing and other

subjects of that class. That is, gentlemen, what technical education is with us. There are in addition to these technical institutions the Law College and the Medical College, and the School of Engineering just started. In addition to these there are two or three industrial schools of most elementary wood-carving : that is all that stands for technical education in our province. I do wish that something more were done in this direction, and with this object in view I think this Conference will be conferring a great blessing upon our Province if they ask the Government to do something in that direction. (*Cheers.*)

The President then put the resolution to vote and it was carried unanimously.

III.—AGRICULTURAL EDUCATION.

MR. G. SUBRAMANIA IYER (Madras), in moving the third resolution said :—

Mr. President and Gentlemen,—The resolution I have the honour to place before you runs as follows :—

“That this Conference records its sense of appreciation of the action taken and contemplated by the Government in regard to the establishment of Agricultural Colleges in the several provinces, and would urge that in view of the importance of a wider spread among the cultivating and landholding classes of a practical knowledge of the principles of scientific agriculture and modern methods, Government would be pleased to establish experimental and demonstration farms as widely as possible, and to start schools in connection with them, at least one in every district, and that the education in these schools should be imparted in the vernacular.”

This is a plain resolution, gentlemen, on which it is not necessary to say much to bring its importance home to your mind. This is a resolution which has often been pressed from many a platform wherever such questions are discussed. It is all very well to establish Agricultural Colleges and Research Institutes, but you have to bring home to the ryot the knowledge acquired in those colleges and institutes and the results of the researches made there. Our ryots are very conservative, and they are unwilling to adopt the methods of even the neighbouring districts. But this new departure has become very essential in the methods of our agriculture, and also in the

knowledge at the disposal of our cultivating classes. You know very well the pressure on the soil is increasing and the soil does not produce enough to feed every man and all cattle. Besides expenses have to be incurred on an increased scale. Therefore it has become very necessary that the cultivable soil should produce more than it has done till now, and also the fact has to be borne in mind that an increasing population presses upon an exhausting soil. Therefore modern methods must be taught to our ryots. But in order to do that mere colleges and research institutes will not do. In order to bring home to the ryots the results of the researches carried on in the institutes, you must give object lessons to the agricultural classes on demonstration farms. You do not want only one of them in every Province. Every village school should have a small demonstration farm attached to it. I may also add that a good deal of patience is necessary, and you must not get disgusted because the ryots do not learn in a few years. It is to be regretted that so far as my province goes not much has been done in this direction. I think I remember that once Mr. Chatterton suggested that so many as 500 such schools should be started, but the Government of Madras did not see their way to do so. With these remarks, gentlemen, I propose that this resolution should be passed. (*Cheers*.)

RAO BAHADUR KHANDUBHAI G. DESAI (Surat), in seconding the resolution said :—

Mr. President, Brother-Delegates and Gentlemen,—In seconding this proposition I shall take the liberty of saying something about the poverty of the agriculturists and about the backward state of the agriculturists to a certain extent. We all know, of course in a general way, that the agriculturists in this country are very poor. I have been trying to collect some statistics on this point, and I find that Mr. Digby in his book states that they can hardly earn Rs. 13 per head all through the year. I myself have been trying to take out certain other figures, and I cannot put the earnings at more than Rs. 15 per head. Now, gentlemen, that means that a family of four or perhaps three has to live on a sum of Rs. 45 throughout the whole year, and all of us can imagine how difficult that is, and that is why we say that the cultivators are very poor. But, gentlemen, I do not mean to imply that the

country is very poor. But as that question is not before us, I will pass to another point, *viz.*, the backwardness of the agriculturists. There again the other point that because the agriculturists are poor, India on the whole is poor does not follow. Although the agriculturists are very backward, there is a village within five miles from this place where cultivation is carried on in such a highly satisfactory manner that Mr. Mollison and the Director and Assistant Directors of agriculture are highly pleased. In Nadiad also, cultivation is carried on in an excellent manner. But here and there people are wanting in knowledge of methods of cultivating their soil. Gentlemen, we have, therefore, to try to educate these people, and for that purpose Government has taken up the subject and they are going to establish Colleges in all the Presidencies. Our own province has had an agricultural school attached to the College of Science for a number of years, and we have been giving diplomas here in agriculture for a number of years. But while the institution formed only part of another institution, the amount of attention that ought to have been given to such an institution could not have been given, and consequently Government have been pleased to make it a separate institution and Dr. Mann, who has read his valuable paper before this Conference a little while ago, is the respected Principal of that institution. Gentlemen, we all know how much depends upon the head of an institution. If the head takes interest in it and sees that the students that come learn properly and in such a way that whatever they learn they could use afterwards and teach to others, then only can the College be useful. (*Hear, hear.*) The college should not simply give a small amount of instruction, and give them diplomas to qualify them to take up Government service as Inspectors in the Agricultural Department. In that case, gentlemen, the whole of the time and trouble of teaching is thrown away. Therefore, gentlemen, I am very glad to hear from the lips of Principal Mann that he was going to conduct the school on the lines on which such institutions ought to be conducted. I hope, gentlemen, that the principals that might be appointed to the colleges that are going to be started in the other provinces will be gentlemen who take an equal interest in the institutions under them, and we shall then see real progress made in the direction of

agricultural education. However, that is for simply providing the machinery for teaching the people. I would urge that there ought to be at least one agricultural school in each district and I would further urge that the teaching in that school should not be in English but in the vernacular of the province, because the teaching is wanted not for the purpose of obtaining Government service or for any other purpose, but it is required for the agriculturists in order to make them understand what are the best methods of agriculture and other matters such as selection of seed and so on, and it is the agriculturists who are to be taught in that school. In a district like Surat, although it has got a population of five or six lakhs, the number of people who could read and write English is put down in the last Census as only about 500. Under such circumstances, if the education is to be imparted in English it can reach a very, very small proportion of the people of the district. I would, therefore, urge that we must prominently point out in the resolution that the education in these schools should be in the vernacular.

Now I will proceed to a further point which is not in this resolution, and I may perhaps ask the mover to add a small rider with the permission of our President and with the permission of this meeting, *viz.*, that to every free school which Government is going to locate in every village, a small farm of about 10 acres should be attached (*hear, hear*) and every boy in that school should be required to work on that farm for three or four hours according to age from the beginning and thus should be required to see something about agriculture in order that the boy should not become soft-handed. I do not mean to say that the Government should give us all these village schools with farms at once, but I say that if in the course of ten years Government is pleased to give us all these schools, we shall have enough. Now the question will be asked as to how we are to find all this money required for the farms. As to that, I may tell you this much, that the surpluses with the Government are not likely to decrease but are likely to go on increasing every year; consequently, now, instead of remitting further taxation Government should go on applying the surplus for this purpose. There is one item of expenditure

from which we could take something for this purpose, *viz.*, the Military Charges.

The President.—The rider suggested by Mr. Khandubhai *viz.*, that education in the village schools should be imparted in vernacular is in order and might be adopted, but there is a question about the attaching of farms. I would, therefore, request Mr. Khandubhai to consider whether it would be worth his while to press that part of his rider.

Mr. Khandubhai.—Unless a farm is attached to every school I would not be satisfied, but I am bound to abide by the ruling of the President.

The President then put the proposition as amended to vote and it was carried by acclamation.

IV. AGRICULTURAL BANKS.

Rao Bahadur Lalshankar Umiashankar (Ahmedabad), in moving the fourth resolution said :—

Mr. President, Brother-Delegates and Gentlemen,—The resolution I am asked to put before you is as follows:—

“That this Conference begs to call the attention of Government to the urgent need of promoting the establishment of Agricultural Banks to help cooperative credit societies and to advance loans directly to agriculturists at reasonable rates of interest, and further begs to suggest that the advice and cooperation of representative members of the Indian community may be enlisted in devising a suitable scheme to secure this object.”

The gentleman who represents the Agricultural Department here has told us the importance of the subject which affects 80 per cent. of the population. In the preceding resolution we have dealt with the question of their ignorance. The condition of the agriculturists is certainly pitiable. They are ignorant, and they are so poor that they cannot find sufficient food to maintain themselves, much less to go on with the work of agriculture. So they need help. Where is that help to come from ? They must go to the *Sowkars*. But the *Sowkars* take advantage of the ignorance and the needy circumstances of the agriculturists in various ways, in interest, in payment and in calculation. So Government have taken measures to release the agriculturists from the clutches of the

Sowkars. They have established cooperative credit societies. But where are these to get funds from? Cooperative credit societies require funds. The agriculturists themselves being poor, they cannot from among themselves collect a sufficient amount and lend money to their brethren. So anyhow funds must be collected, and if the *Sowkars* are again asked then there will be some difficulty; so we must ask Government to give help to such cooperative credit societies and such cooperative credit societies would then get help by the establishment of banks. Then the banks cannot be established in every village, they must be in important places. So what would be the proper relations between banks and cooperative credit societies must be ascertained and established. The banks cannot lend money without security and without settling the rate of interest, and also without the means of repayment. For this purpose there must be some agency to advise Government and to assist the bankers. Government have their *takavi* system but many agriculturists find it difficult to obtain their *takavi* from revenue officers. So such banks must be assisted by benevolent gentlemen, by persons who are working for the agriculturists, and who are willing to cooperate with such banks. So we must ask Government to cooperate with persons who are interested in the welfare of the agricultural population. I, therefore, ask you with these remarks to adopt this resolution. (*Cheers*.)

Mr. THAKORRAM KAPILRAM (Surat), in seconding the Resolution, said :—

Mr. President and Gentlemen,—I have been asked to support this proposition, which has been placed before you by our esteemed friend, Rao Bahadur Lalshankar Umiashankar. Gentlemen, you know that cooperative credit societies have been established by some of our countrymen, and agricultural banks are necessary as a complement in order that those societies may be successful. This Resolution further proposes that in preparing a scheme Indian members should be consulted beforehand, and as all these points are put properly in the Resolution, I need not add anything more to it. (*Cheers*.)

The President then put the Resolution to vote and it was carried unanimously.

V.—THE MINING INDUSTRY.

RAO BÂHADUR R. N. MUDHOLKAR (Amraoti) moved the fifth Resolution, which runs as follows :—

“(a) That this Conference expresses its sense of satisfaction at the successful formation of the Tata Iron and Steel Company, Limited, with the help entirely of capital raised in India.

“(b) That this Conference invites the attention of capitalists in India to the urgent need of developing and fully utilising the mineral resources of the country, and trusts that, in view of the ultimately lucrative character of the industry, they will make organised efforts in that direction.

“(c) That this Conference is of opinion that special consideration should be shown to Indian enterprise and initiation by the Government and preferential treatment should be given to it.”

He said :—Gentlemen, I am very glad to say that the proposition is one which is not merely of a non-contentious character, but one as regards which there will hardly be any difference of opinion throughout the length and breadth of India. In regard to the first paragraph of this Resolution, I feel special pleasure in emphasising it. There was a time, a year and nine months ago, when I and certain friends felt very great grief when we heard that the Tata Iron and Steel Company would not be started with Indian capital and that Messrs. Tata & Sons were obliged to apply to foreign countries for obtaining the requisite capital. But now, gentlemen, none of us need feel sorry. We were ready to do what we could by giving up our work and going about the country and trying to raise capital, and proposals were made in this connection. I may mention the name of Mr. Barjorji Padsha in this connection. But at that time it was found that the Tata Company had already entered into a contract with an English Company. But now I learn that the scheme fell through, and I am glad for it. Gentlemen, my satisfaction is not due to any racial or political considerations whatsoever. This, I suppose, I need not dilate upon. It is, gentlemen, because (I may claim to have my views in regard to this matter) we feel that the mineral resources of the country

are accumulated capital, the benefits of which should be taken by the children of the soil that we feel a satisfaction that the Tata Company is an entirely Indian enterprise. I read with great satisfaction the prospectus of Messrs. Tata & Sons inviting capitalists to purchase shares, and before my letter could reach them for ordinary shares, they were all taken up. Gentlemen, there is this feeling of satisfaction which I hope all of you will participate in.

In regard to the second paragraph, gentlemen, I would add for your information that the Berar iron and coal are the best. However, the opinion of experts is that the coal is not capable of being turned into coke. I think that is likely to be achieved soon, and when that is achieved you will find another iron field in juxtaposition to the other enterprise. What we require in connection with this is knowledge. The Government of India have sent to England for training two young men to whom they have given scholarships, and we have to do our own part in the matter. We hope that the rich gentlemen of Surat will be able to find another equally good field for their enterprise and their money. Then there is one matter with regard to the third paragraph of this Resolution. If you are to take the lists of gentlemen who obtained concessions, you will find that it is not too early to make that request to the Government of India. This is a matter with regard to which Mr. Holland himself says that the number of Indians who have obtained concessions is so very small. Therefore I hope that Government will accept this request. With these remarks I place the Resolution before you. (*Applause.*)

The HON'BLE Mr. G. K. PAREKH (Bombay), in seconding the Resolution said :—

Mr. President and Gentlemen,—I have great pleasure in seconding this Resolution. In doing that I do not propose to make a speech. Many are going into the business of mining, and making that part of the industry successful. You know that, so far as our Presidency is concerned we have done during the last two or three years considerable mining work in manganese. But we have to export much of our manganese ore to England and we are not able to manufacture manganese out of the ore. Looking to the large quantity of the manganese ore that is exported from Bombay, it would be much

better if we were able to utilise it in our own country and turn it into manganese. In the same way there is a number of metals and ores, and it would be better if we should build factories in our own country for the purpose of working the ores into metals. The other matter referred to by Mr. Mudholkar is really very important. Many licenses have been granted, but mostly to Europeans. It may be we cannot understand why preference is given to other people. But even if no preference be given to our countrymen we shall have to approach Government in this matter. (*Cheers.*)

The President then put the Resolution to vote and it was carried unanimously.

VI. COTTON SPINNING AND WEAVING.

Mr. L. K. TULASIRAM (Madura), in moving the sixth Resolution, said :—

Mr. President and Gentlemen, — The proposition that I have been asked to propose is one which relates to a large section of the Indian public. You know that next to agriculture, the industry which should be called the most important industry is weaving. The proposition is as follows :—

“(a) That this Conference records its sense of satisfaction at the stimulus the spinning and the weaving industry have received from the Swadeshi movement, and it urges the bestowal of increased attention on cotton cultivation, the erection of spinning and weaving mills at suitable centres, and the revival of the hand-loom weaving industry on a commercial basis, as essential to the success of the movement.

“(b) That this Conference urges the Government to remove the restrictions retarding the expansion of the industry and to provide facilities for affording practical instruction in weaving by the establishment of weaving schools at every important weaving centres.”

We are glad to have heard some of the valuable papers read here, and from them we learn that they have succeeded in growing Egyptian cotton in our fields. There is also a movement owing to which Government have been thinking of making a reduction in the assessment of the land on which cotton is cultivated. They are going to give a premium of two to four annas per acre where that cotton is cultivated,

The supply of yarn is also very defective in India. Sometimes the local mills send their yarn to Hongkong and Shanghai. The local mill-owners of the Madras Presidency prefer the China to the Indian market. But it is their duty to give preference to the local market. It is to be regretted that a larger number of mills is not coming into existence in my part of the country. There is a want of mutual confidence and of a spirit of enterprise. I suggest that some of the captains of industry of Western India may start mills in the Madras Presidency. I have collected shares to the extent of six lakhs of rupees and for want of four lakhs more, I am not able to go on with the concern which I myself have projected. When the Swadeshi movement was at its zenith we prepared a lot of cloth for the Calcutta market. I want the gentlemen who are interested in this weaving industry to know what the requirements are of the people of different provinces. I also appeal to rich gentlemen who are interested in the revival of the hand-loom industry to try their utmost to have textile schools established everywhere. Weaving is connected so much with mechanics. I say that chemistry is connected with dyeing and mechanics is connected with weaving. It is indispensable that our weavers should know a bit of mechanics. If you start textile schools the hand-loom weaving industry in the whole country will become prosperous. With these remarks I commend this Resolution to your acceptance. (*Cheers.*)

MR. S. B. SANKARAM (Ellore), in seconding the proposition, said :—

Mr. President and Gentlemen,—I am asked to second this proposition and when I consented to do so I did not intend to speak on cotton. I thought my friend, Mr. Tulasiram would do justice to it. Forgetting, for the time being, 'cotton' in the heading, we see spinning and weaving. I hope I shall not be ruled out of order if I say a word or two on what has been done in a northern district of the Madras Presidency. Attempts have been made for a very long time—long before the partition of Bengal was ever thought of, to revive the industries of the country, and to introduce new industries. I may tell you that the young Zemindar of Pithapore has been making attempts to start a cotton spinning and weaving mill in his own estate. He has set apart a portion

of his estate for growing cotton. Before that, humble efforts were made by individuals as well as by limited companies to encourage the fly-shuttle looms. Those of you that have ever visited our part of the country know fully well that the Northern Circars *muslins* are liked by European ladies. We want encouragement. We want that you of the Western Presidency should help us by establishing mills and factories there. I have been spending sometime in Bombay only for that purpose. I have been here in connection with an industry, and am trying to raise a small capital. We have started in Ellore a jute factory to which reference has been made by the President in his address. The President has said that the jute industry has been up to this time a monopoly of the foreigners. There are about 40 mills worked by English capital. There is only one mill in Calcutta which is owned by a Gujarati gentleman. I have not found any mill owned by the Bengalis. However, now it may be said to their credit that they are doing some practical work. Now to come to my point, we have been able to start a company which we have named as the Krishna Jute and Cotton Mills Company, Ltd. The capital was five lakhs of rupees. We have been able to sell shares to the extent of four lakhs and five thousand rupees, and all this money has come from Indians only. The Municipal town of Ellore has contributed a lakh and twenty thousand rupees. The only difficulty is as regards the six hundred shares we have not been able to sell. I have come here in the hope that we might get some capitalists to help us. There is another jute mill at Guntur. It is still under construction. They are trying their level best to complete it. The difficulty with them is, as usual, of money. I therefore draw your attention to that fact. There are also attempts being made to extend the cultivation of jute. With these remarks I beg to second this proposition. (*Cheers.*)

The President then put the Resolution to vote and it was carried unanimously.

VII.—THE SUGAR INDUSTRY.

The seventh Resolution runs as follows :—

"(a) That this Conference notices with concern the increase in the imports of foreign sugar, and in order to arrest the

steady decline of the indigenous industry, this Conference urges the introduction of healthier and more prolific varieties of cane, the employment of greater care in cultivation, the use of more economical processes for extracting the juice, and above all, the adoption of the most modern and efficient methods of refining.

“(b) That this Conference urges on the Government the necessity of providing more extensive irrigational facilities, allowing the utilisation of bye-products, and considering the desirability of imposing import duties to protect the indigenous industry from being destroyed by foreign competition.”

The HONOURABLE PANDIT MADAN MOHAN MALAVIYA (Allahabad), in moving this Resolution said :—

Mr. President and Gentlemen,—The sugar industry is one of our most important industries. It is a matter of great grief that while our indigo industry has been destroyed by the action of foreign countries, particularly Germany, we are running the risk of losing our sugar industry also. I will not detain you by going into many figures. One or two figures will suffice. The imports of sugar last year amounted to something like half a million tons, about a fourth of the total production of the country. The value of imported sugar last year was over seven crores of rupees. That, I think, is sufficient to enable you to judge how great has been our loss in this industry. That will also enable you to judge how greater will be the loss if you allow this industry to be entirely destroyed. In 1854 the quantity of sugar imported was 80,000 tons and worth 2 crores and 14 lakhs. In 1905-6 the quantity imported was so much as to be worth 7 crores and 77 lakhs. As a result a great deal of the indigenous sugar industry has been and is being further destroyed. I do not think that there is any Government—any civilised Government—either in Asia or in Europe which would look without concern upon the destruction of such an important industry. The Government of India have not been quite inactive ; for many years they have noticed the fact and taken steps to avert the calamity to the indigenous industry. But the steps were not adequate. What is needed is protective duties to be imposed in order to shut the gates against foreign sugar. This point was referred to by

one of the official members of the Viceroy's Council last year. The Government of India recognised the necessity of imposing countervailing duties in 1899, because there have been bounties in France, Germany, Austria, and Russia. The countervailing duties of 1899 had the effect of shutting the gates against bounty-fed foreign sugar. The result was that in two years' time, after the countervailing duties were imposed, the imports of bounty-fed foreign sugar were very much reduced. Later on, when the countervailing duties ceased to exist, in, I think, 1903, the result was that from that time forward the imports of foreign sugar have gone on increasing, and I fear they will go on increasing from year to year until Government once more recognises the necessity of adopting the same steps which it had recognised the necessity of adopting some years ago. There is one advantage in this connection which we have. England is not a sugar producing country, and I do not think there will be any competition between England and India in this matter. If there was competition, we could not reasonably expect England to levy protective duties. But, where there is absolutely no competition between the English industry and Indian industry, we do think we are not wrong in asking England to protect us against the industries of other countries which have the greater advantage of working on scientific lines. It is not only the bounties that are against us, but the scientific methods of Germany and Austria are also against us. Owing to our old methods of refining sugar and our primitive method of production we produce 1·3 tons of sugar per acre, whereas Egypt grows 3 tons, Cuba 2 tons, and so on. Owing to our antiquated methods of producing sugar and owing to the combinations of European manufacturers the result has been an immense injury—an irretrievable injury—to our country. If Government recognised the wisdom of imposing countervailing duties in 1899 they will now see that unless the gates are again closed against foreign sugar there is no hope of saving this industry in the country. Do not let it be imagined for a moment that I am blind to, and that I do not recognise, the measures the Government are taking in this direction. In the Agricultural Department in my own province much is being done. But the Government must impose protective duties to shut out

foreign sugar from India. The *Pioneer* in discussing this question, rightly said that this was one of the steps which would shut out foreign sugar. If the Government of India is awakened to the enormity of this situation, we can soon improve this industry of the country. The situation being grave, I do not think the Government, if they realise it, will turn a deaf ear to our proposals on this question. We are talking of reviving our industries. Here is one of the most important and one of the most valuable industries which is being crushed to death under our very eyes. The figures of import are mounting up year after year showing that more and more money is going out of our country in this direction. We are in need of protection, and the duty rests upon us of saving ourselves from the present perilous situation. Send appeals from every district and every tahsil asking Government to impose protective duties on foreign sugar. I feel sure the question has only to be placed before Government and it would be considered. (*Cheers.*)

MR. MANUBHAI NANDSHANKAR MEHTA (Baroda), in seconding the Resolution, said :—

Mr. President and Gentlemen,—Time was when our country exported a large quantity of sugar. But those days are now long gone by, and we see a large quantity of foreign sugar imported into our country. At one time we were threatened with this foreign invasion merely from Mauritius, but now a good deal of sugar is imported into India from many other places. The only remedy, therefore, is as proposed by Pandit Madan Mohan Malaviya. Besides this we have also to look to the cultivation of cane. There is the necessity of introducing healthier and more prolific varieties of cane, and for doing that Government must be requested to improve irrigational facilities. As regards the permission to use bye-products, Government might permit us to manufacture rum from the bye-products of sugar. With these observations I second this Resolution, which has been so ably put before you. (*Applause.*)

LALA DHARAMDAS SURI (Lahore), in supporting the Resolution, said :—

Mr. President and Gentlemen,—I gladly support this Resolution. I may be allowed to add an observation to this Re-

solution. My friend, Lala Ruchiram, said in connection with Technical and Commercial education, that no action was taken on the deliberations of the Committee to which he has referred in his speech. About this Resolution I may say that Government did take action, and that is that the Government has raised the water-rate on sugar-cane cultivation. (*Shame.*) Gentlemen, this Resolution shows what our needs are, but we do not know why the cry of these needs does not reach England. We express and formulate our needs from time to time, but our voice does not reach England. (*Applause.*)

MR. CHUNILAL VRIJBHUCANDAS MEHTA (Bombay), in further supporting this Resolution, said :—

Mr. President and Gentlemen,—I wish to support the view of the learned mover that protection is essential. Perhaps there is one point which has escaped the Honourable Pandit Madan Mohan Malaviya's notice. It is this, that the British Government, on account of the agitation of the foreigners joined the Brussels Convention. If our Government now follows suit, it will be disastrous. We should have a protective tariff in order to prevent foreign sugar from being imported into India. The state of the industry is miserable, and unless this action is taken it will become still more disastrous. The Bombay Chamber of Commerce agrees with this view, I therefore, request you to carry the proposition unanimously. (*Applause.*)

The President then put the Resolution to vote and it was carried unanimously.

VIII. APPOINTMENT OF OFFICE-BEARERS AND PROVISION OF FUNDS FOR THE YEAR 1908.

The eighth proposition is as follows :—

“ That this Conference re-appoints Rao Bahadur R. N. Mudholkar as General Secretary, and Mr. C. Y. Chintamani as Assistant Secretary, and it appeals to the public for a sum of Rs. 10,000 for meeting the expenses for the next twelve months.”

SIR BHALCHANDRA KRISHNA (Bombay), in proposing this Resolution, said :—

Mr. President and Gentlemen,—The proposition with which I have been entrusted is that this Conference re-appoints Rao

Bahadur R. N. Mudholkar (*cheers*) as General Secretary, and Mr. Chintamani (*cheers*) as Assistant Secretary. Gentlemen, I hope that just as you have cheered the first part of the proposition you will also cheer the second part, which is an appeal for funds. This proposition does not require any lengthy remarks from me to commend it to you. The General Secretary has done excellent work throughout all the two years, and has been devoting his time and attention to the work of the Conference from the time that it has come into existence. He has done his best to further the cause. His Assistant you know, and I need not make any remarks about him. He has been indefatigable in his work. He has done his duty both at Amraoti and in the places he has visited. I do not think it is necessary that I should in any way advance any argument in support of these two gentlemen. They stand on their own legs.' The second portion is that of providing Rs. 10,000 for the expenses of the Conference Office. Last year, you must have heard the Secretary reading, Rs. 10,000 were promised, but less than half the sum came out. That is a state of things that ought not to continue, and it is inadvisable in the interests of this Conference. The Conference is one which concerns itself with the most important interests of the people, and if we stint in supporting it we shall not be doing our duty. I appeal to you, to the whole of India for this purpose, and I am sure that if only our province contributes its mite, we should soon have the Rs. 10,000. In the course of six or seven months the General Secretary will have all the money that is required for the expenses of the office in order to keep the work going, and in order to show satisfactory work at the next Conference. Therefore, all of you, and your friends who are interested in the success of this Conference, will contribute your mite to this sum. About Rs. 3,600 have been subscribed, and I do not despair of the balance coming in as Mr. Chintamani is an adept at putting his hands in other people's pockets. (*Cheers.*)

The HONOURABLE PANDIT MADAN MOHAN MALAVIYA (Allahabad), in seconding this proposition, said :—

Mr. President and Gentlemen,—The Conference has been doing solid work in the country. I am sure a greater success will be attained in the industrial movement by reason of the activity of the Conference. We are indebted to Messrs.

Mudholkar and Chintamani for the creditable work done by the Conference hitherto, and to them we must tender our best thanks. We hope they will be able to do even better work in future years. As to subscriptions, money is required to carry on the work, and if more money were available more work could be done. If more money were available all these papers could be translated and they would then be the means of enlightening the people with regard to the industrial condition of the country, and with regard to the reforms that we wish to see carried out in that field. These papers should be translated into vernaculars, and made available to people belonging to the different parts of the country. I hope that the Rs. 3,600—the amount subscribed here now—will be increased very soon. I hope you will not only subscribe the money here, but when you go home, you will ask your friends also to subscribe. You have only to make up your minds to collect money, and it will come in. You know we have in this country endowments for religious purposes. You also know how regularly and punctually payments are made towards these funds. That being so, it is a reproach to the educated Indians that we cannot follow the example of the illiterate donors of these endowments. What happened with reference to the collection for this Conference is that one man subscribes Rs. 100, another Rs. 50, and so on. What is needed is a rupee subscription. If you approach people in this way they will subscribe handsomely and heartily. If you make up your minds to go about and collect subscriptions and remit them to Mr. Mudholkar you will make your work doubly interesting. With these words I commend the Resolution to your acceptance. (*Cheers.*)

The President then put this Resolution to vote, and it was carried unanimously and with acclamation.

VOTE OF THANKS TO THE CHAIR.

Babu Ganga Prasad Varma (Lucknow) said :—

Gentlemen,—All of you will agree with me that our hearty thanks are due to Dewan Bahadur Ambalal Sakerlal Desai for his presiding on this occasion and for his instructive address, (*Cheers.*)

Professor. T. K. GAJJAR, the Chairman of the Reception Committee, said :—

Gentlemen, I call upon you to carry this proposition with acclamation. (*Loud and prolonged cheers.*)

PRESIDENT'S CONCLUDING SPEECH.

The PRESIDENT, DEWAN BAHADUR AMBALAL SAKERLAL DESAI, said in closing the proceedings :—

Gentlemen, I am very much obliged to you for according this cordial vote of thanks to me. We have been treated here very kindly, and before we separate we must thank the Reception Committee for the excellent work they have done. (*Applause.*) We have seen many Congress Halls, but this is the most beautiful hall that we have ever seen, and for this great credit is due to our friend, Rao Bahadur K. G. Desai. (*Cheers.*) This Conference has done very useful work. We have had very learned and valuable and useful papers read to us. The papers by themselves form the best justification for continuing the Conference. But it is something more than that. The 'Directory of the Indian Goods' is an extremely valuable publication, and the best proof of it is that it promises to be entirely self-supporting. Government also have patronised it by purchasing many copies. (*Cheers.*) What we wish is that there should be a central Indian institution for the advancement of Indian industry and commerce. (*Applause.*) I am very glad that you agree with this opinion of mine. But you must remember that it is a matter of funds. If we can give some money to Government, why should we not spend some money on the Industrial Conference? If such money will be forthcoming it might be possible to give scholarships to young men for receiving industrial and technical education. (*Applause.*) Gentlemen, we have got telegrams of sympathy from the Thakor Sahab of Morvi, Mr. Lalubhai Samaldas and other gentlemen. Several new subjects have been brought to our notice. We hope to be able to take up these subjects at the next Conference. This morning the judges of hand-looms have examined the hand-looms exhibited outside this Pandal and they have awarded prizes. The Central Agricultural Committee of Madras has presented a set of its publications to this Conference and we have to thank them

for the same. I now declare the Conference dissolved.
(*Loud and prolonged cheers.*)

Contributions promised.

	Rs.
Collections in Bombay by the Honourable Mr. Vithaldas Damodher Thackersey	... 1,000
The Honourable Mr. Vithaldas Damodher Thackersey, Bombay...	250
The Honourable Mr. V. Krishnaswami Iyer, Madras	... 200
Dewan Bahadur Ambalal Sakerlal Desai and Sons	... 200*
Rao Bahadur R. N. Mudholkar, Amraoti	... 150
Lalubhai Samaldas, Esq., Bombay	... 150
The Honourable Mr. Gokaldas K. Parekh, Bombay	... 100
Sir Bhalchandra Krishna, Kt., Bombay	... 100
Professor T. K. Gajjar, Bombay	... 100
The Honourable Munshi Madho Lal, Benares	... 100
P. R. Sundara Iyer, Esq., Madras	... 100†
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Dr. Harold H. Mann, Poona	... 100
The Honourable Pandit Madan Mohan Malaviya, Allahabad	... 50
Rao Saheb Deorao Vinayak, Akola	... 50
Dewan Bahadur L. A. Govindaraghava Iyer, Madras	... 50
N. Subbarao Pantulu, Esq., Rajahmundry	... 50
The Honourable Mr. H. S. Dixit, Bombay	... 50
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Narandas Purushottamdas, Esq., Bombay	... 50
Rao Bahadur Madhavram Harnarayan Vyas, Cambay	... 50
Manubhai Nandshankar Mehta, Esq., Baroda	... 50
Manubhai Nanabhai, Esq., Bombay	... 30
G. A. Natesan, Esq., Madras	... 30
C. Y. Chintamani, Esq., Amraoti	... 30
The Honourable Mr. K. R. Gurusawmi Iyer, Tinnevely	... 25
Rao Bahadur Raoji Bhai Patel, Baroda	... 25
N. M. Bedarkar, Esq., Amraoti	... 25
Rao Bahadur Khandubhai G. Desai, Surat	... 25
C. M. Gandhi, Esq., Surat	... 25
Rao Bahadur Narayan Trimbak Vaidya, Bombay	... 25
Professor Ruchi Ram Sahni, Lahore	... 25
Markand Nandshankar Mehta, Esq., Bombay	... 25
Babu Ganga Prasad Varma, Lucknow	... 20
V. Ramesam, Esq., Madras	... 20
Dayabhai Harjivandas, Esq., Baroda	... 20
Rao Bahadur Lalshankar Umiashankar, Ahmedabad	... 20

* Rs. 100 as nucleus of a permanent fund.

† For prizes at hand-loom competition.

	Rs.
' I. C. S.," Allahabad	... 15
D. G. Dalvi, Esq., Bombay	... 15
G. S. Mudholkar, Esq., Amraoti	... 51
Lala Dharamdas Suri, Lahore	... 10
R. A. Deshpande, Esq., Amraoti	... 10
B. J. Shastri, Esq., Bombay	... 10
B. J. Shah, Esq., Ahmedabad	... 10
Bezonzi M. Jambusaria, Esq., Surat	... 10
Bhulabhai B. Patel Esq., Ahmedabad	... 10
R. R. Kale, Esq., Satara	... 10
Jaikishendas M. Vakilna, Esq., Surat	... 10
B. D. Amin, Esq., Bombay	... 5

Total Rs... 3,600

APPENDIX I.

The Third Indian Industrial Conference, Surat.

HAND-LOOM DEMONSTRATION.

REPORT OF THE JUDGES.

Factory Looms.

Four types were represented in this section; the first three being priced at from Rs. 100 to Rs. 150, the last being of the ordinary fly-shuttle class.

One was of a new type exhibited by Mr. Churchill of Ahmednagar and named *Churchill's New Loom*.

The power-loom type was represented by Mr. Kapilram's *Buckoo Loom* made in Surat.

The Japanese or foot-loom type was represented by the following looms :—(1) Palanpur loom ; (2) Bombay Loom Company's *Shivaji Loom* ; (3) Surat foot-loom by Mistri Nagindas Dayabhai.

The fly-shuttle type was represented by the Nadiad Hand-loom Company's loom and by a Direct-connection loom by Mr. Kapilram.

The Churchill new loom is worked by foot like the other foot-loom, but the weaver's seat is a bicycle seat, so arranged that he can work by pressing his feet straight down and so obtain the greatest advantage in working with the least exertion on the muscles. This arrangement requires the worker to lean forward on a guard rail over the cloth-beam, but after a little practice the position is likely to prove restful. There are no wheels to turn the shaft, but a leather band, connected with the ends of the foot levers, goes round the shaft and turns it round alternately backwards and forwards and works the sheds as well as the sley. A curved double spring with ball bearings controls the speed. This arrangement leads to easy working by saving the labour of turning the wheels, and friction.

The taking-up arrangement is simple and practically the same as was used in the old Churchill loom, but it does not seem to work evenly for evenness of texture. We would recommend the use of some sort of positive taking-up arrangements. With this change the loom would be very useful for hand-weaving factories, where simple cloths of under 40s counts are to be woven.

Mr. Kapilram's Buckoo loom is an automatic loom of a simple type with positive working on the shaft, by turning a wheel and with positive taking-up motion.

As one man turns the wheel on the side, another man is required to look after the cloth and weft supply. A weft stop-motion with a bell is attached in order that one man may be able to attend to two looms. The system of turning the wheel, however, is tiresome and the stop-motion requires some improvement. Otherwise the loom is very simple and with Mr. Kapilram's further efforts, it is likely to prove a very useful one for the same class of work as the Churchill loom.

The other looms in this section require no description. They are adaptations of the so-called Japanese loom, which has proved a practical failure for Indian purposes, and the workmanship in some of them leaves much to be desired.

Of this class the Palanpur loom seems to be the best. The ordinary fly-shuttle looms show nothing new.

In all these looms it is noticeable that, where the inventor or the manufacturer is a practical weaver as well as a mechanical engineer, good results are obtained, whereas a deficiency in either respect only produces a more or less clumsy machine.

We recommend the prize for factory looms of Rs. 125 to be awarded to the New Churchill loom.

Cottage Looms.

Three looms have been exhibited in this class, all by the Sayaji Loom Works of Baroda. Excepting the picking arrangement, which is very simple and increases the working speed to the same extent as the factory looms, all other arrangements are kept the same as in the country loom. The loom is thus suitable for every kind of work that can be done on the ordinary country loom, the outturn being increased two to two and a half fold. This loom is named the Sayaji Poor Man's Loom and priced at Rs. 25 to 30 according to size. The three looms exhibited were working, respectively, a simple China silk and Chandrakala saree with silk border of 40's warps and 50's weft and a silk border mango design dholi of 80's warp and weft.

The back motion of the sley which is necessary to make room for the working is utilised for driving the shuttle by a simple arrangement of straight levers and strings. The work is divided between hands and feet and the weight of the worker is utilised in a push stroke, which drives the shuttle, thus ensuring easy and continuous working at a high speed. While the English dobby on a fly-shuttle loom requires raising the shed by one foot and dropping it down, the dobby arrangements in these looms are so made that the worker has simply to work the treadles alternately by the feet as for simple weaving. We consider this loom as the best adapted for introduction among the weavers and recommend the award to it of the prize of Rs. 125 for cottage looms.

T. K. GAJJAR,
L. K. TULASIRAM,
DEORAO VINAYAK,
Judges.

January 1908.

APPENDIX II.

List of Delegates of the Third Industrial Conference.

1. **Calcutta.**—Maharajah Bahadur Jagadindra Nath Roy of Nattore, Maharajah Bahadur Surya Kanta Acharya of Mymensingh, the Honourable Dr. Rashbehary Ghose C.I.E., Babu Bhupendra Nath Basu, Babu Surendra Nath Tagore, Mr. A. Chaudhuri, Mr. J. Chaudhuri, Mr. P. Chaudhuri, Mr. A. Rasul, Rai Jotendro Nath Chaudhuri, Mr. A. H. Ghaznavi, Rai Parvati Sankar Chaudhuri, Mr. Lalmohan Ghose, Rai Brojendro Kishore Roy Chaudhuri, Mr. J. N. Roy, Babu Muralidhar Roy, Dr. Nil Ratan Sircar, Babu Provash Chandra Mittra, Babu Satyanand Bose.

2. **Hooghly.**—Babu Bishnupada Chatterji, Mr. M. C. Palit, Babu Dasarathi Ghosh, Mr. A. C. Dutta, Babu Bepin Behary Mitter.

3. **Assam.**—Babus Debendranath Dutta, Nolin Behari Ghosh, Charu Chandra Sinha, Dr. Satya Charan Mitter, Tripura Charan Dhur, Khajendranath Mitter, Jogendra Nath Chatterjee.

4. **Masulipatam.**—Messrs. V. Ramadas, K. Srirama Sastri, S. Hanumantha Rao, M. Somayajulu, C. Srinivasa Rao, K. Hanumantha Rao, B. Venkatarayudu, G. Harisarvotthama Rao, K. Krishna Rao, U. Anjaneyulu, Rao Bahadur P. Venkatappiah.

5. **Madras.**—The Honourable Mr. V. Krishnaswami Iyer, Dewan Bahadur L. A. Govindaraghava Iyer, Messrs. N. Subba Rao Pantulu, P. R. Sundara Iyer, G. A. Natesan.

6. **Akola.**—Rao Bahadur R. N. Mudholkar, Rao Saheb Deorao Vinayak, Messrs. G. S. Khaparde, B. N. Mudholkar, R. V. Mahajani, N. M. Bedarkar, Ganesh Nagesh Sahasrabuddhi, Pandurang Bapuji, M. V. Joshi, Wasudev Balaji Pimplekar, Dhondo Moreshwar Hingwe, Vishnu B. Savji, Ganesh Waman Soman, Sampat Rao Deshmukh, Dr. Gadgil, R. G. Mundle, B. R. Landge, M. B. Paranjpe, N. K. Phadke, Lalji Vitthoba.

7. **Karnatak.**—Messrs. Trivikram Kashinath Pitre, Vithal Venkatesh Joshi, Krishna Rao Mudvedkar, Gopal Rao Deshpande, Bandurao Mutalikar.

8. **Bombay.**—The Honourable Mr. Vithaldas Damodher Thackersey, Mr. Hansraj P. Thackersey, Mr. Jehangir Bomanji Petit, Mr. Narottam Morarji Gokuldas, Mr. Gordhandas Khatau Makanji, Dr. M. G. Deshmukh, Rao Bahadur C. V. Vaidya, the Honourable Mr. Daji Abaji Khare, Messrs. G. K. Gadgil, V. R. Joshi, Dr. T. D. Velankar, Messrs. V. B. Paranjpe, Ali Mahomed Bhimji, G. L. Page, Manilal Trivedi, J. R. Gharpure, N. B. Ranade, Vishwanath P. Vaidya, D. G. Padhye, B. R.

Manerikar, K. T. Dongre, V. S. Apte, K. S. Manerikar, G. N. Joshi, S. R. Bakhle, Joseph Baptista, T. D. Sanghvi, Y. L. Bhandarkar, B. G. Puralkar, L. M. Sathe, V. S. Rao, G. G. Athalye, K. R. Mitra, M. P. Parekh, P. N. Kakar, Chandanal N. Jagirdhar, Trimbakrao Harnarayan, Varjivandas Tribhowandas, Amiruddin Tyabji, Ambasankar U. Mulji, Sir Adamji, Peerbhoy, Bomanji J. Wadia, B. F. Dastur, Sir Bhalchandra Krishna, *Kt.* Messrs, Bhaisanker Nanabhai, B. N. Bhajekar, M. R. Bodas, the Honourable Mr. H. S. Dikshit, Messrs. Virchand Dipchand, Balubhai Damodardas, the Honourable Mr. Chimanlal Harilal Setalvad, Messrs. Chunilal D. Saraiya, Kalyandas Kesavdas, Chaganlal Dayabhai, Chandulal Mathuradas, Kasturbhai Nagarseth, Chimanlal Lalubhai, D. E. Wacha, Dadabhai Naoraji, Damodardas Sukhadwala, Dharamse Morarji Gokuldas, Dorab J. Tata, the Honourable Mr. Darasha R. Chichgar, Sir Dinshaw Petit, Messrs. D. G. Dalvi, Dwarakadas Goverdhandas, Dalpatrai Maganbhai, Daulatram Kirparam, Fazulbhoy Currimbhoy Ebrahim, G. S. Rao, Goverdhandas Gokuldas Tejpal, the Honourable Mr. G. K. Gokhale, Messrs. Gulabchand M. Damania, Gulabdas Bhaidas, the Honourable Mr. G. K. Parekh, Messrs. Gulabchand N. Kapurchand, H. A. Wadia, H. K. Koyaji, Hiralal M. Munshi, the Honourable Mr. Ibrahim Rahimtoola, Messrs. Ichcharam Suryaram Desai, Jagmohandas Vandravandas, Jamnadas Narandas, Jivanchand Dharamchand, Karimbhai Adamji Peerbhoy, Abdul Hussain Adamji Peerbhoy, Kazi Kabiruddin, Kamruddin Amiruddin, Sir Currimbhai Ibrahim, Kalidas Umabhai, Keshavlal Manilal, Lalubhai A. Shah, Narandas Purushottamdas, Naranji Dwarakadas, N. G. Velinkar, the Honourable Sir Pherozeshah M. Mehta, K.C.I.E., Messrs. Kikabhai Premchand Roychand, Purushottamadas Thakordas, P. K. Karanjawalla, Pranjivandas Narandas, R. B. Mazumdar, R. J. Tata, R. M. Munshi, B. Raghavayya, Ratilal Keshavlal, S. H. Hodivalla, Soonderdas Narandas, Talekchand Navalchand, T. R. Desai, Uttamram Keshavram Trivedi, Rao Bahadur Vasanji Khimji, Messrs. Vrijbhukandas Atmaram, Vishnu Krishna Bhatawadekar, Chandulal V. Dewan.

9. **Ahmedabad.**—Dewan Bahadur Ambalal Sakerlal Desai, Rao Bahadur Lalshankar Umiashankar, Mr. Govindarao Appaji Patil, Mr. Ramanbhai Mahipatram Nilkanth, Mr. Chimanlal Gajendar, Mulchand Ichcharam Shah.

10. **Satara.**—Mr. R. P. Karandikar.

11. **Sholapore.**—Mr. P. L. Nagpurkar.

12. **Kolhapore.**—Messrs. V. G. Bijapurkar, D. Saligram, V. B. Kulkarni, K. D. Kulkarni.

13. **Thana.**—Messrs. V. L. Bhave, S. B. Patel, S. G. Phadke.

14. **Poona.**—Messrs. K. P. Khadilkar, N. C. Kelkar, S. M. Paranjpe, S. K. Damle, L. R. Rangarkar.

15. **Wai.**—Mr. M. G. Abhayankar.

16. **Pandharpur.**—Mr. V. S. Jog.

17. **Sangle.**—Mr. V. R. Phadke.

18. **Dharwar.**—Mr. M. D. Kale.

19. **Broach.**—Messrs. Ambasankar Uttamram Malji, Antoldas Hargovindas, Thakorlal Chimanlal Munshi, Thakorlal Pranlal Marla, Girdhanlal Harinath Desai, Maganlal N. Choksi, Mukandram Atmaram Desai, Dayabhai Dalpatram Dalal, Trimbaklal Bhavanisankar, Maneklal Sakerlal Desai, Pranlal Tribhowandas Choksi, Ichchalal Amritlal, Jamietram Narbheram Trivedi, Krishnalal Balwantram Desai, Dr. Sorabji F. Kapadia Messrs. K. J. Amin, Hiralal Pranlal Desai, Harjivan Raichand, Dhirajlal Madanlal Desai, Sankarprasad H. Desai.

20. **Cambay.**—Rao Bahadur Madhavram Harnarayan Vyas.

21. **Sind.**—Rao Bahadur Hiranand Khemsingh Advani, Messrs. Mathuradas Ramchand Jhaveri, Khemchand Amritrai, Keshavdas Bhawanidas, Chandulal Gopaladas, Harchandrai Vishindas.

22. **Surat.**—Messrs. J. D. Atkin., I.C.S., A. R. Bonus, I.C.S., G. Walst, I.C.S., N. T. Baker, I.C.S., G. C. Madgacnkar, I.C.S., Dayaram Gidumall, Dr. H. Benett, Messrs. D. S. Kaikhushru, Bomanji Edulji, Ratanji E. Modi, Kavasji E. Modi, Dr. Dossabhoy Pestonji, Messrs. J. Talyarkharn, M. Husain Ibrahim, Mir Mussabi Khan, the Honourable Mr. Syed L. Edrus, Khan Bahadur Burjorji Nusserwanji, Messrs. Kariyasi Burjorji Vakil, Ishwai das Jagjivandas Store, Madhavaram B. Hora, Karpurram Manmathram Mehta, Thakordas Mathuradas, Chandulal Mathuradas, Kalabhai Lalubhai, Nagarseth Balubhai Gulabbhai, Ragnathji N. Totia, Gelabbhai Jagjivandas, Maneklal Narottamdas, Ishmailji Yusufalli, Sorabji Master, Naranbhai Mehta, Prabhasankar D. Padliia, Hargovindas H. Khandwala, Ardesir M. Gandhi, Anupram Kriparam, Abdul Kadir Vasiwala, Tribhowandas Narottamdas Malvi, Tribhowandas Kaliandas Gajjar, Rao Bahadur Khandubhai Gulabbhai Desai, Tyabhoy M. M. Maskatiwala, Bulwantram Tripurasankar, Manubhai Nanabhai, Thakorram Kapilram, Bezonji M. Jambusaria, Markand Nandshankar Mehta, Dhirajlal Bhimbhai, Bhagubhai Dayabhai, Bhagubhai Dwarakadas, Bhaichand Kasturchand, Bhagubhai Jamnadas, Rao Bahadur Naginchand Javerchand, Faizullabhai Heptullabhai, Dr. Fardunji E. Sherdivala, Messrs. Ganpatram Anupram Trivedi, Gordhandas Bhagawandas, Gangadas Rangildas, Gangaram Varajdas Bharatia, Rao Bahadur Gulabdas Purushottamdas, Himatram Keshavram, Rao Saheb Hiranand Motichand, Hiralal Dayabhai Nanavati, Hirabhai Nemchand, Ichcharam Vrijbhukandas, Indrajit Kalabhai, Jamictram Jiwanram, Jai-kishendas K. Gajjar, Jai-kishendas Morarbhai, Jehangirji Manekji Atia, Gangubhai Jiwanbhai, Dr. (Mrs.) Jamsetji F. Laskami, Dr. Kaulidas N. Moodi, Messrs. K. P. Desai, K. K. Desai, Kesavbhai Bulakidas Kesarichand Rupchand, Dinshaw J. Edalbehram, Chunilal Maneklal Gandhi, Prasannavadanram Motabhai, Chandramukhram Bhimanand, Shanmukhram Krishnamukhram, Chhotalal Ambaram, Chandulal Mathuradas, Chunilal Dayabhai, Chunilal Bulakhidas, Chunilal Kikabhai, Davod-bhai Abdul Hussainalli Karanjiwala, D. K. Desai, Dhirajlal Umedram, Balubhai Labhai, Dr. Dosabbhai Pestonji, Messrs. Balubhai Gulabbhai Nagarseth, Chunilal Gulabchand, E. E. Karwa, Krishnalal Nanabhai

Haridas, Krishnalal Ratanlal Daftari, Krishnamukhram Atmaram, Lala-bhai Vrijbhukandas, Maganlal B. Seth, Dr. M. M. Mehta, Mr. Muhammad-bhai Amiruddin, Dr. M. M. Raiji, Messrs. Manchashankar Jiwanram, Mancharam Shivilal, Manubhai Prajabhai, M. V. Thakor, Manmohandai Dayaldas, Mansukhlal Mugetlal, Mansukhlal Ichchalal Vakil, Manubhas Nandshankar, Motabhai K. Atmaram, M. K. Dixit, Motabhai Mugatla, Desai, Motilal M. Munshi, Motiram Gordhandas, Motiram Raghavjili Mancharam Gopaladas, Madhavaram B. Hora, Mir Muzaffar Harankhan, Mir Masavla Khan Sahib, Motibhai Thakardas, Maneklal Narottamdas, Malapchand Anandchand, Naginbhai Ghelabhai, Nagindas Harjivandas, Nagindas Kapurchand, Nandavardhan Kapurchand, Nathabhai Lalubhai Vakilna, Nanabhai Ratilal, Nooruddin Esufalli, Dr. Nasaravanji N. Khambatta, Messrs. N. V. Choksi, Nemchand Melapchand Jhaveri, Noormahomed Rajimahomed, Resbhudas Vrijbhukandas, Popatbhai Bhagubhai, Pranlal Abheram, Pranjivandas Shivilal, Nemchand Premchand, Pritamlal Dhirajlal, Dr. Ramlal Lalubhai, Messrs. Ranchandas Narandas, R. R. Doctor, Rupchand Lalubhai, Rangildas Nagindas, Dr. Rukhmabai, Messrs. Raghunathji N. Tatia, Motilal Umedram, Ranjitram Kalabhai, Savaichand Surchand, Savaksha Khagubhai, Sorabji Ratanji Wacha, Thakorabhai Chaganbhai, Tribhowandas G. Papawally, Tribhowandas K. Engineer, Haji Esmail Ahmad, Thakordas Mathuradas, Esmailji Ebrahimji Tapidas Dayaram, Dr. V. S. Dewan, Messrs. Vijubhai Trikemdas, Vithaldas Ishwarilal Shroff, Vithaldas Gordhandas, Varajdas Labbhai, V. T. Pandit, V. M. Pakvasa, M. M. Pakvasa, Vaman S. Nabar, Kavasji Dhanjisha, Husan Kasam, Maganlal Purushothamdas, Surchand Purushothamdas, Pranshankar Bhavanisankar, Jivanlal V. Desai, C. N. Thakor, D. D. Mehta, C. I. Mochi, Gavinbhai Wathibhai, Raojibhai B. Patel, Raojibhai M. Patel, Vasantha Rao Dhybar, Professor Masani, Chimanlal P. Dalal, Ardeshir D. Kuper, Mansukhram Bhagubhai, Mangaldas Girdhardas, Chimanlal Nagindas, Khusaldas Gokuldas Shroff, Dr. J. Shillichy, Keshavlal S. Hinglokvala, Sobhagchand Naginchand, Fakirchand Ghelabhai, Asharam D. Shah, Horinusji Khursedji, L. M. Bose.

23. **Baroda.**—Messrs. K. E. Dadachanji, Abbas S. Tyabji, V. G. Bhandarkar, D. H. Nanavati, M. Mudhorkar, G. H. Desai, Kilabhai Dubbharam, Sivabhai Motebhai.

24. **Sachin.**—The Nawab Sahib of Sachin, Mr. E. J. Talyarkhan, Rao Bahadur Ichcharam Bhagawandas.

25. **Nadiad.**—Mr. Bhagwandas Harkissendas.

26. **Pordi.**—Jamsetji Hormusji.

27. **Randir.**—Messrs. Ahmed A. Esmaïl, Gulam Hussain, Babuseth Ajam, Keshavlal Kashilal.

28. **Benares.**—Babu S. Moti Chand, Hari Das, Baldeo Das, Chandra Mohan Varma, Dr. Megh Nath Banerji, Pandye Shankar Nath.

29. **The Punjab Chamber of Commerce.**—Rai Bahadur Shri Krishna Das and Mr. Harkishen Lal.

REPORT

OF THE

WORK OF THE

Indian Industrial

Conference

INCLUDING A

RECORD OF GENERAL INDUSTRIAL ACTIVITY
IN THE COUNTRY.

1907.

Madras :

PRINTED BY THOMPSON & CO.,
AT THE "MINERVA" PRESS, 33, BROADWAY.

1907.

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REPORT

OF

Industrial Conference Work and Record

OF

**General Industrial Activity in the Country in the
Thirteen Months ending with November 1907.**

PART I.

INDUSTRIAL CONFERENCE WORK.

November and December 1906.

1. The report submitted to the Second Indian Industrial Conference at Calcutta covered the ten months from January to October 1906. The work that mainly occupied the time of the Conference Office in the months of November and December was the seeing the first edition of the Directory of Indian Goods through the press, the preparation of the Annual Report, and arrangements in connection with the last session of the Conference.

2. A meeting of representatives of the several Provincial Committees and a few others specially invited by the General Secretary, was held at Bombay on the 17th and 18th November 1906, and the nomination of President of the last Conference, the selection of subjects to be placed before it and the drafting of Resolutions on them were dealt with on the occasion. The draft Resolutions were circulated among the Provincial Committees for opinion and they were reconsidered, discussed and finally settled at a second meeting of representatives of the Provincial Committees and of prominent delegates held at the rooms

of the Bengal Landholders' Association on the 25th December.

3. The Assistant Secretary, Mr. Chintamani, after completing his work for the year at the central office, visited Calcutta, Benares and Allahabad in the last week of November and the first week of December, and spent the latter month at Calcutta assisting the local Committee in making arrangements for the Conference.

4. The meetings of the Conference were held at Calcutta on the 29th and 31st December under the presidency of the Hon'ble Mr. Vithaldas Damodher Thackersey of Bombay. His Highness the Maharajah Gaekwar of Baroda did the movement the honour of delivering an Inaugural Address on the opening day of the session. The papers read, the addresses and speeches delivered, and the Resolutions passed at the Conference are now issued in a book form. We regret greatly that the publication did not take place earlier.

January to November 1907.

5. By Resolution VI of the last Conference Rao Bahadur R. N. Mudholkar and Mr. C. Y. Chintamani were re-appointed General and Assistant Secretary respectively, and the President and the General Secretary were empowered 'to appoint an Additional Assistant Secretary and establishment on suitable pay, so that the Assistant Secretary may be free to visit the different provinces and help the Provincial Committees in all matters in which they may require assistance.' The Conference further resolved to allot 'a sum of Rs. 10,000 for meeting the expenses for the next twelve months, and also for issuing a quarterly bulletin of industrial information under suitable management.' In point of fact less than a half of the sum voted has been subscribed. Consequently, an Additional Assistant Secretary could not be appointed nor could a quarterly bulletin of industrial information be issued,

6. The Assistant Secretary visited Calcutta ; Bombay ; Allahabad, Benares and Cawnpore in the United Provinces ; Vizagapatam and Vizianagram in the Madras Presidency ; Nagpur in the Central Provinces, and Akola in Berar, during the course of the year. He actively assisted the United Provinces Committee of the Conference in organising the First United Provinces Industrial Conference and the Exhibition Committee at Vizagapatam in organising the Second South Indian Industrial Conference. He was unable to visit more places, as unfortunately he fell ill in April and after first trying to work in spite of his sickness, had to take a long leave,—and no second Assistant Secretary having been appointed as was contemplated, his presence was required at the central office immediately he was in a position to return to duty. Mr. Chintamani has submitted a separate report similar to last year's. It is annexed to this report.

7. The General Secretary submitted the Resolutions of the Calcutta Conference to the Government of India and the various Provincial Governments.

8. A Memorial on Industrial Survey has been submitted to the Government of India in accordance with Resolution III of the Calcutta Conference. (*Vide* Appendix I.)

The General Secretary regrets that on account of continued ill-health and other unexpected difficulties he has not been able to prepare a Memorial on Technical and Commercial Education in accordance with Resolution I of the Calcutta Conference. He, however, hopes to do so at an early date. The subject itself has not been overlooked by him, as the correspondence between him and the Central Provinces Administration, printed as Appendix II, will show.

9. A Hand-loom Competition was held at the Calcutta Exhibition, under the auspices of the Industrial Conference, and prizes of the value of Rs. 500 were awarded to the winners in the competition. A report on the same written by two of the judges, Rao Bahadur Raoji Bhai Patel of Baroda and Mr. M. A. Sampath Iyengar of Mysore, was published recently, and it is appended. (*Vide* Appendix III.) The

thanks of the Conference are due to these gentlemen for their very informing, useful and interesting report.

10. It had been settled by the General Secretary that there should be a handloom weaving competition along with this year's Conference as there was last year and that prizes should be given to the successful competitors. But owing to the uncertainty which prevailed for a long time about the place of meeting of the Congress and therefore of the Conference, no definite steps could be taken to give effect to this intention. Meanwhile came communications from Madras that there would be an All-India Weaving Contest there in February next under the auspices of the National Fund and Industrial Association, which is also the Provincial Committee of the Conference, and that the Local Government had offered to make a substantial grant-in-aid of it. If the Conference would have been held in Madras as it seemed probable at one time, there was no object in having a Competition in Christmas when another on a bigger scale was to be held two months later. Eventually it was settled that the Conference would meet at Surat where the Congress would be held. This was decided too late for arrangements to be completed for a successful competition of the sort we had last year, the more so as there would be no Exhibition this year. The idea had, therefore, to be regretfully given up.* Both for this reason and in response to suggestions from friends in Madras we have decided, to co-operate with the Madras Committee in the All-India Weaving Competition which they have arranged and to offer some prizes in connection therewith.

11. With reference to the Industrial Survey questions framed by the General Secretary last year, it was stated in last year's annual report that although about 1,000 copies had been sent to different persons and bodies only 20 replies

* Since this was in type the Surat Committee have announced their intention of holding an exhibition of local manufactures and a handloom demonstration along with the Conference. If so, the Conference will give prizes at the latter.

had been received, and that 'renewed efforts would have to be made to complete this enquiry.' Accordingly they were again sent to about 300 persons this year. The number of replies received is 15. These are appended. The questions also are reprinted to facilitate reference. (*Vide Appendix IV.*) The thanks of the Conference are due to the gentlemen who have kindly responded to the Secretary's appeal for supply of information.

12. The whole of the first edition of the "Directory of Indian Goods," which was published in December last, having been sold out, and it appearing that there is a considerable demand for it, a second edition, revised and enlarged, has been prepared by the office. A slight change in the title of the compilation has been rendered necessary by the addition of several new features which, it is hoped, will, to some extent, enhance its usefulness as a book of reference. "The Directory of Indian Goods *and Industries*," as it will be known, is in the press and will be ready for use about the 20th December.

13. The First Bombay Provincial Industrial Conference was held at Surat in the Easter holidays under the presidency of Mr. R. C. Dutt, C. I. E. Several interesting papers were read at it, and Resolutions were passed on Industrial Survey, Technical and Commercial Education, Handloom Weaving, the Gujarat Silk Industry, Sugar Industry and Co-operative Associations, among other subjects. There was a splendid Industrial Exhibition at Surat on the same occasion, and its opening ceremony was performed by the Hon'ble Mr. J. W. P. Muir-Mackenzie, Senior Member of the Bombay Executive Council.

Another Conference, the First Karnatak Industrial Conference, was held at Dharwar in the month of May with the Hon'ble Mr. Daji Abaji Khare as President. The principal Resolution of the Conference was that a Technical School be established at Dharwar at a cost of nearly Rs. 75,000. We believe the promoters of the Conference have been exerting themselves to give effect to this.

14. The Second South Indian Industrial Conference and the South Indian Industrial Exhibition were held at Vizagapatam in June. The Hon'ble Mr. J. N. Atkinson, Member of the Madras Board of Revenue, presided at the opening ceremony of the Exhibition, and the Hon'ble the Rajah of Kurupam was the Chairman of the Committee of Management. The President of the Conference was Dewan Bahadur L. A. Govindaraghava Iyer. An interesting feature of the Conference was a long discussion on the address delivered by Mr. Alfred Chatterton, Director of Technical and Industrial Enquiries, Madras, in which several delegates took part. The Conference passed Resolutions on Technical Education, the Organization of Capital, Agriculture and Mining in Zamindaries, and the Weaving Industry, among other subjects.

The Committee of the National Fund and Industrial Association, which acts as our Provincial Committee for the Madras Presidency, has done useful work during the year. It has sent students to foreign countries to receive Technical Education. It has arranged to hold an All-India Weaving Competition at Madras next February with the assistance and co-operation of the Local Government. The Hon'ble Mr. V. Krishnasawmy Iyer has offered Rs. 5,000 for starting a weaving school at Madras, and the matter is engaging the Committee's attention.

15. The United Provinces Committee held their first Provincial Industrial Conference at Allahabad on the 1st April. Rai Bahadur Lala Baij Nath presided over it. His Honour Sir John Hewett, Lieutenant-Governor of the Provinces, sent a message of sympathy with the movement through Mr. W.H. Moreland, Director of Land Records and Agriculture, U.P., who attended the Conference with two of his Assistants, and read a paper on the Sugar Industry. The noteworthy feature of the Conference was the decision which was arrived at to found the United Provinces Pioneer Sugar Mills Co., Ltd., with a capital of one lakh of rupees, of which Rs. 53,600 were subscribed on the spot. The latest we

heard about this was that the promoters intended to start a factory at Allahabad. The United Provinces Industrial Association was formed at the Conference and its Committee acts as the United Provinces Committee of our Conference. Other Resolutions passed related to the Weaving Industry and Technical Education. Major E. Atkinson, R.E., Principal of the Thomason Engineering College, Roorkee, contributed an important paper on Technical Education to the proceedings of the Conference.

Early in the year the Oudh Industrial Association was formed at Lucknow with the object principally of promoting the aims of the Indian Industrial Conference, and it resolved "to place itself in communication with the central office of the Indian Industrial Conference and seek its advice and help."

16. The Central Provinces and Berar Industrial Conference was held at Raipur in the Easter holidays, Mr. M. B. Dadabhoy, one of the Directors of the Berar Manufacturing Company, presiding. At this Conference two separate Industrial Committees were formed for the Central Provinces and Berar, with head-quarters at Nagpur and Akola respectively. Rao Saheb Deorao Vinayak, Secretary of the Berar Committee, has kindly sent in a report on the work done during the year, and it is appended. (*Vide* Appendix V.) We have already referred to the correspondence between Rao Bahadur R. N. Mudholkar and the Local Administration on the subject of Technical Education, which is the outcome of the Conference held last year at Jabalpur.

17. Towards the end of October a communication was addressed by the General Secretary to the Provincial Committees touching several important matters relating to the Conference. It is printed as Appendix VI.

18. The Third Indian Industrial Conference, which is to

meet in Christmas week, as usual, will be held, not at Nagpur as originally expected, but at Surat, where the National Congress will hold its session. At a meeting of the representatives of the Provincial Committees held at Bombay on the 10th November, several important questions relating to it were considered. The Assistant Secretary will be deputed to Surat early this month to assist the Committee that will be formed there in making the necessary arrangements for it.

19. Interest in the industrial movement continues unabated on the part of the people, as testified to by the record of the general industrial activity in the country which is printed in Part II of this Report. The Government of India and the Provincial Governments as well as the Governments of Indian States, too, continued to evince sympathetic interest in the movement. A brief account of the steps taken by them will be found in Part II. We desire to make special acknowledgments of the most valuable and greatly needed work begun by the United Provinces Government for the furtherance of industrial development. It is to the large-hearted sympathy and broad-minded statesmanship of Sir John Hewett that the new policy owes its origin.

20. We may perhaps say a few words at this place on the future organization and working of the Conference movement. That it has done some useful work during the very short period of its existence, will, we take it, be conceded. Though it may not be able to advance a valid claim to having carried out any important original or constructive work, it has shown its usefulness at least as an agency for the collection and dissemination of valuable information on subjects in regard to which there is the greatest necessity to add to the knowledge of the public. It will, we trust, not be out of place to quote the observation made by the *Indian Textile Journal* in one of its recent issues, that "if the Indian National Congress leaves no other record to posterity than the annual Industrial Conference, it will still have strong claims on the good will of progressive Indians."

This organization has been the means of influencing Provincial activity in matters of industrial development, and there need be no doubt that the movement will filter downwards. The opinions expressed and the proposals made at its meetings may be said to have attracted attention in influential quarters as is evidenced by the proceedings of the Industrial Conference held at Naini Tal in August last under the auspices of the United Provinces Government. This is satisfactory so far as it goes. But it is only a modest beginning and a great deal more can be done and ought to be done to make the Conference a better organized and more efficient body achieving substantial and enduring results. We realize that progress can only be the work of time and must be slow to be lasting. But there will be progress only if the supporters and well-wishers of the movement, who we are glad to think are many, work earnestly in furtherance of its aims. We invite their active help and co-operation in this patriotic duty and are confident of a cordial response.

21. We are indebted to the managers of several prominent newspapers and periodicals for their kindly supplying their journals to the office of the General Secretary. They have been of great help in the work which the office has been carrying on. We beg to repeat our acknowledgments to the Supreme and the Local Governments and Administrations for their kindness in giving to our office their Gazettes and other publications bearing on industrial matters.

22. Statements of Receipts and Disbursements of the office of the General Secretary are published with this Report.

23. We would again place on record our appreciation

of the valuable services which Mr. C.Y. Chintamani, the Assistant Secretary of the Conference, has been rendering to the cause of industrial development in India by his devotion, earnestness and self-sacrificing zeal.

VITHALDAS DAMODHER THACKERSEY,

BOMBAY,
3rd December 1907.

}

President,

Second Indian Industrial Conference.

AMRAOTI,
1st December 1907.

}

R. N. MUDHOLKAR,
General Secretary,
Indian Industrial Conference,

**Summary of Accounts of the Indian Industrial Conference for the two months,
November and December 1906.**

Receipts.		Disbursements.	
	Rs. A. P.		Rs. A. P.
On "Directory of Indian Goods" Account ...	260 11 0	Pay of the Assistant Secretary, and other Estab- lishment Charges ...	595 0 0
Donation by the Hon. Rai Nihal Chand Ba- hadur, Muzaffarnagar ...	100 0 0	On "Directory of Indian Goods" Account ...	412 9 9
Donation by Munshi Raghu Nandan Prasad, Bareilly ...	25 0 0	On Handloom Competition Account ...	225 0 0
Sundries ...	6 0 0	Travelling expenses of the Assistant Secretary (and of a Clerk with the General Secretary on one occasion) ...	172 8 0
		Telegrams ...	37 6 0
		Railway freight ...	20 0 0
		Postage ...	16 0 0
		Printing ...	15 7 0
		Binding ...	12 15 0
		Stationery ...	2 15 0
Total ...	391 11 0	Total ...	1,509 12 9

11

AMRACI,

29th April 1907.

R. N. MUDHOLKAR,
*General Secretary,
Indian Industrial Conference cc.*

Summary of Accounts of the Indian

Receipts.	Amount.		
	Rs.	A.	P.
Collections in Baroda through Mr. R. C. Dutt ...	1,500	0	0
The Hon'ble Munshi Madho Lal, Benares ...	500	0	0
The Hon'ble Pandit Sunder Lal, Allahabad ...	250	0	0
Dayaram Gidumal, Esq., Surat * ...	250	0	0
Rai Bahadur Lala Bajji Nath, Allahabad † ...	150	0	0
The Hon'ble Rai Nihal Chand Bahadur † ...	150	0	0
R. C. Dutt, Esq., Baroda ...	100	0	0
Harkishen Lal, Esq., Lahore ...	100	0	0
Sir Bhalchandra Krishna, <i>Kt.</i> , Bombay... ..	100	0	0
Lajpat Rai, Esq., Lahore ...	100	0	0
The Hon'ble Mr. Justice P. C. Chatterjee, Lahore ..	100	0	0
Rai Bahadur Lala Ganga Ram, Lahore ...	100	0	0
R. P. Karandikar, Esq., Satara ...	100	0	0
N. Subbarao, Esq., Rajahmundry ...	100	0	0
Ramanuj Dayal, Esq., Mecrut * ...	100	0	0
T. Rangachariar, Esq., Madras ...	100	0	0
Dewan Bahadur Ambalal S. Desai, Ahmedabad ...	50	0	0
Rai Saheb Lala Kedar Nath, Delhi * ...	50	0	0
Rai Saheb Lala Girdhari Lal, Delhi ...	50	0	0
Pandit Sundar Lal Pathak, Patiala ...	50	0	0
Thakurdas Fatehchand, Esq., Karachi ...	50	0	0
Mathuradas Ramachand, Esq., Karachi ...	50	0	0
Dr. M. N. Ganguly, Cawnpore ...	30	0	0
Dr. H. D. Pant, Lucknow ...	25	0	0
G. A. Natesan, Esq., Madras ...	25	0	0
Pandit D. Gopalacharlu, Madras ...	25	0	0
V. M. Mahajani, Esq., Akola ...	25	0	0
Rao Bahadur G. V. Joshi, Satara ...	25	0	0
C. R. Thiruvengkatachariar, Esq., Madras ...	25	0	0
Munshi Raghunandan Prasad, Bareilly ...	25	0	0
The Himalaya Glass Works, Rajpur ...	25	0	0
Sums below Rs. 25 ...	109	8	0
On "Directory of Indian Goods" Account ...	282	8	0
Sundries ...	17	14	0
Total...	4,739	9	0

* For handloom prizes.

† Rs. 50 for handloom prize.

Industrial Conference for the year 1906.

Disbursements.	Amount.		
	Rs.	A.	P.
Pay of Assistant Secretary and other Establishment charges	1,920	0	0
On " Directory of Indian Goods " Account	816	15	9
Travelling charges of Assistant Secretary (and a clerk with General Secretary once)	339	12	9
On Handloom Competition account	225	0	0
Postage	83	7	3
Printing	60	1	0
Telegrams	57	12	0
Books and Papers	35	15	0
Stationery	31	8	0
Railway freight on sundry things	20	0	0
Binding	12	15	0
Sundries	10	14	0
	3,614	4	9
Balance on 31st December 1906 Rs..	1,125	4	3
Total Rs...	4,739	9	0

AMRAOTI,
29th April 1907.

R. N. MUDHOLKAR,
General Secretary,
Indian Industrial Conference.

Summary of Accounts of the Indian Industrial Conference

Receipts.	Amount.		
	Rs.	A.	P.
Opening Balance	1,125	4	3
On "Directory of Indian Goods" Account	1,758	8	6
The Hon'ble Mr. Vithaldas Damodher Thackersey, Bombay	500	0	0
Seth Damodardasji Khemrajji, Bankers, Beawar	500	0	0
R. C. Dutt, Esq., C.I.E., Baroda	250	0	0
V. Krishnaswamy Iyer, Esq., Madras	200	0	0
H. H. The Maharajah of Mourbhanj, Mourbhanj	200	0	0
Lalubhai Samaldas, Esq., Bombay	150	0	0
Rao Bahadur R. N. Mudholkar, Amraoti	150	0	0
Rao Bahadur Lala Baij Nath, Allahabad	150	0	0
Dr. Harold H. Mann, Calcutta	100	0	0
Messrs. Morarji Gokuldas & Co., Bombay	100	0	0
R. N. Mookerjee, Esq., Calcutta	100	0	0
R. Ramachandra Rao, Esq., Kurnool	100	0	0
Sir Bhalchandra Krishna, Kt., Bombay	100	0	0
Maharajah Manindra Chandra Nandi, Cossimbazar *	100	0	0
The Hon'ble Mr. Gokuldas K. Parekh, Bombay	100	0	0
Rai Yatindra Nath Chaudhuri, Calcutta	100	0	0
Ghulam Ali Chagla, Esq., Karachi	100	0	0
The Hon'ble Pandit Sunder Lal, C.I.E., Allahabad *	100	0	0
C. Vijiaraghavachary, Esq., Salem	50	0	0
A. Rangaswamy Iyengar, Esq., Mysore	50	0	0
The Hon'ble Mr. H. S. Dixit, Bombay	50	0	0
Harkishen Lal, Esq., Lahore	50	0	0
Vishwanath P. Vaidya, Esq., Bombay	50	0	0
Pandit Motilal Nehru, Allahabad	50	0	0
Dr. Tej Bahadur Sapru, Allahabad	50	0	0
N. Subbarao Pantulu, Esq., Rajahmundry	50	0	0
The Hon'ble Babu Jogendra Nath Mukerji, Purnea	50	0	0
S. N. Pandit, Esq., Rajkot	50	0	0
Dewan Bahadur Ambalal S. Desai, Ahmedabad	50	0	0
Mathuradas Ramchand Jhaveri, Esq., and Rao Bahadur Hiranand Khemsingh Advani, Hyderabad (Sind)	50	0	0
Dewan Bahadur L. A. Govindaraghava Iyer, Madras	50	0	0
N. M. Bedarkar, Esq., Amraoti	50	0	0
G. A. Natesan, Esq., Madras	30	0	0
C. Y. Chintamani, Esq., Vizagapatam	30	0	0
R. P. Karandikar, Esq., Satara	30	0	0
R. Muthukrishna Iyer, Esq., Pudukotah	25	0	0
Boikunt Nath Sen, Esq., Berhampore	25	0	0
Rao Bahadur Waman Madhav Kolhatkar, Nagpur	25	0	0
D. E. Wacha, Esq., Bombay	25	0	0
J. N. Tagore, Esq., Calcutta	25	0	0
Krishna Rao Phatak, Esq., Nagpur	25	0	0
The Hon'ble Mr. P. S. Sivaswami Iyer, Madras	25	0	0

* For handloom prize.

for the Eleven Months January to November 1907.

Disbursements.						Amount.		
						Rs.	A.	P.
Pay of the Assistant Secretary, and other Establishment Charges	...	...	...	...	...	1,905	5	0
Printing	...	...	...	...	...	988	13	0
On " Directory of Indian Goods " Account	...	...	...	...	...	551	13	6
On " Handloom Competition " Account	...	...	...	...	...	525	9	0
Travelling Charges of the Assistant Secretary, etc.	...	...	...	...	...	410	9	6
Lost by theft	...	...	...	...	...	125	0	0
Postage	...	...	...	...	...	104	7	0
Stationery	...	...	...	...	...	87	10	0
Telegrams	...	...	...	...	...	29	9	0
Books and Papers	...	...	...	...	...	28	13	0
Sundries	...	...	...	...	...	8	2	0
Binding	...	...	...	...	...	5	0	0
Balance						4,720	11	0
						2,465	1	9
Total						7,185	12	9

AMRAOTI,
1st December 1907.

R. N. MUDHOLKAR,
General Secretary,
Indian Industrial Conference.

Summary of Accounts, etc.—*contd.*

Receipts.	Amount.		
	Rs.	A.	P.
Lal Ruchi Ram Sahni, Lahore...	25	0	0
Keshavalal M. Mehta, Esq., Ahmedabad	25	0	0
Rao Bahadur Raoji Bhai Patel, Baroda	25	0	0
The Hon'ble Babu Bhupendra Nath Basu, Calcutta	25	0	0
V. A. Desai, Esq., Ahmedabad	25	0	0
V. Ramesam, Esq., Madras	20	0	0
R. R. Kale, Esq., Satara	15	0	0
Rao Bahadur V. N. Pathak, Satara	12	0	0
T. D. Sanghvi, Esq., Bombay...	10	0	0
Sir Gooroo Dass Banerjee, <i>Kt.</i> , Calcutta	10	0	0
Dewan Bahadur K. Krishnaswami Rao, C.I.E., Madras	10	0	0
"A Bengal Friend"...	5	0	0
Dr. Joseph Benjamin, Ahmedabad	5	0	0
Dr. K. G. Deshpande, Satara	5	0	0
N. K. Agashe, Esq., Satara	5	0	0
V. G. Chirmule, Esq., Satara	4	0	0
D. N. Phadnis, Esq., Satara	2	0	0
D. G. Divekar, Esq., Satara	2	0	0
Y. R. Patwardhan, Esq., Satara	2	0	0
G. H. Devi, Esq., Satara	2	0	0
G. K. Devdhar, Esq., Poona	1	0	0
Total...	7,185	12	9

Report submitted by the Assistant Secretary.

November and December 1906.

I went to *Bombay*, on the 15th November to attend the meeting of representatives of the Provincial Committees which was held there on the 17th and 18th idem, and returned to Amraoti on the 20th idem. The month was mostly occupied in the compilation of last year's Annual Report. I left Amraoti on the 26th November and was at *Calcutta* for the rest of the year, except for a few days spent at *Benares* and *Allahabad*, which centres I visited early in December. I addressed public meetings there on industrial questions. Benares is the birth-place of the Conference and *Allahabad* the capital of the province, and it was pleasing to notice the keen interest with which the citizens of both places were watching the progress of the movement.

January to November 1907.

2. I was re-appointed Assistant Secretary at the *Calcutta* Conference, and it was specially enjoined on me by its Resolution that I should regard visits to the several provinces to assist the Provincial Committees as my particular duty. For two reasons, however, I have not been able to carry out the instructions of the Conference. No Additional Assistant Secretary has been appointed to work at the Central Office and I have accordingly been required to spend most of my time at Amraoti. Secondly, I was obliged by ill-health to take leave of absence for four months in the year, and have not been able to do even as much touring as I did last year. I have, therefore, an uneasy consciousness that it is with no record of good work done that I face the next session of the Conference. I can only trust to the generosity of the public to be indulgent in judging of it such as it is.

3. I had to remain at *Calcutta* for the first fortnight of the year to assist in winding up the affairs of the last session. From there I proceeded to *Allahabad* to assist in the preliminary arrangements of the Provincial Industrial

Conference. I returned to *Amraoti* on the 23rd January. I visited *Akola* and *Nagpur* early in February.

4. I left for *Vizagapatam* on the 14th February in connection with the arrangements of the Industrial Conference and Exhibition which were to be held at that place in the month of June. I delivered a public address there on the Swadeshi movement. I visited *Vizianagram*, too, and at a special meeting of the local Industrial Committee held to confer with me the steps that were to be taken by it for collecting information about the industries of the district were discussed.

5. I again went to *Allahabad* and *Benares* in March for the First United Provinces Industrial Conference which was held at the former place on the 1st April under the presidency of Rai Bahadur Lala Baij Nath. Before returning from the United Provinces I paid a brief visit to *Cawnpore*, the industrial and commercial capital of the provinces.

6. I came back to *Amraoti* on the 24th April, but had immediately to take leave on account of illness and proceed home. The South Indian Industrial Conference and Exhibition were held at *Vizagapatam* when I was there on leave, and I did what I could under the circumstances to help in the holding of a successful session of the Conference. Before returning to *Amraoti*, I visited *Rajam*, where a new Weaving Company has been doing useful work since last year, and *Bimlipatam*, where there is a new Pencil Factory at work.

7. I came back to *Amraoti* on the 18th September. Before doing so, however, I went to *Calcutta* for a few days and tried to expedite the publication of the Report of the last Conference and to interest a few of the prominent men of the city in the local Committee of the Conference.

8. The only place I have visited on Conference business since my return from leave is *Bombay*, where I

went to attend a meeting of representatives of the Provincial Committees which was held there on the 10th November. I think I shall be required to spend the month of December at *Surat*, where the next session of the Conference will be held.

9. I humbly express again my sense of keen regret that I have not been able to do good work during the current year.

AMRAOTI,)
24th November 1907. }

C. Y. CHINTAMANI,
Assistant Secretary,
Indian Industrial Conference.

PART II,
*A Brief Account of Industrial Activity in India
in the Thirteen Months November 1906 to
November 1907.*

SECTION A.

*The Governments of British India and Indian States, and
Industrial Development.*

As was done last year we shall attempt to give in this section an indication of the attitude of the Governments of British India and the Indian States towards the industrial movement and a brief account of the measures adopted by them in furtherance thereof.

British India.

2. *General.*—The Government of Bengal actively helped the Committee of the Indian Industrial and Agricultural Exhibition which was held at Calcutta in December last, and His Excellency the Viceroy was pleased to preside at its opening ceremony as a mark of his sympathy with the movement for the development of indigenous industries by Indians.

3. A Committee was appointed early in the year to investigate the question of factory labour. Its report, which was submitted towards the middle of the year, satisfied the Secretary of State of the need of a more thorough inquiry upon which to base legislation to regulate the conditions of labour in factories, and this Commission is now pursuing its inquiries.

4. With reference to Resolution II passed at the Calcutta Industrial Conference, the Hon'ble Mr. G. M. Chitnavis moved the Government of India for the publication of the report of the Indian Stores Committee before the final orders of the Government thereon were passed, but

the Report has not yet been published nor is it known what action the Government propose to take on it or even at what stage the consideration of the subject has arrived.

5. In the matter of Industrial Survey, too, it was evidently left to the discretion of Provincial Governments to determine what action they should take, and only two of these have actually taken practical steps in this direction ; although the Member for Commerce and Industry in the Supreme Legislative Council and later on, the Right Honourable the Secretary of State himself publicly declared themselves in favour of such a survey.

6. The Indian Institute of Science, which India owes to the thoughtful munificence of the late Mr. J. N. Tata, is gradually taking shape, and for this we cannot but be thankful. But this year no new grants were made by the Government of India for the spread of technical education.

7. *The United Provinces.*—Among Provincial Governments the Government of the United Provinces under Sir John Hewett have been honourably distinguished for their attitude of friendliness towards the industrial movement as demonstrated by their activity during the year. Sir John Hewett on his assumption of the Government of the United Provinces lost no time in appointing an officer to carry out an Industrial Survey of the Provinces for which he had so powerfully pleaded last year in the Supreme Legislative Council. And we are justified in looking forward to substantial good resulting from the investigations of Mr. A. C. Chatterjee, I.C.S., the officer selected to carry out the survey.

8. Sir John Hewett summoned in August last a representative Conference to consider the question of the means of industrial development in general and technical education in particular. The Conference sat from the 19th to the 31st August, and made definite recommendations for being given effect to at once. They are confidential still, but are understood to be reasonably liberal and

comprehensive. They are awaiting the sanction of the Secretary of State. We trust that it will be readily forthcoming and that the first solid step in the matter of the promotion of technical education will have been taken ere long in the United Provinces under the auspices of Sir John Hewett.

9. Speaking of the Naini Tal Industrial Conference it is impossible not to notice, with pleasure, the magnificent speech with which Sir John Hewett opened its proceedings. 'It is impossible for any one interested in the industrial development of this country' said Sir John, 'to study the annual trade returns without lamenting that so much valuable raw produce which might be made up locally should leave our ports annually to be conveyed to other countries there to be converted into manufactured articles and often to be re-imported into India in that form.' In regard to the help that Government might render to industrial enterprise Sir John Hewett said :—

'The means by which it is suggested that Government might encourage industrial enterprise are many and varied. It is suggested that Government should itself start pioneer industries and dispose of them to private individuals when the profit-bearing stage is reached—that it should import expert supervisors and skilled workmen for particular industries—that it should build and equip a factory to test the suitability of improved looms and other appliances, and to conduct investigations into improvements in the reeling, winding, warping, and sizing processes of different yarns—that it should start small weaving schools—that it should encourage and assist the adoption and extension of the co-operative principle in every available way, and particularly the extension of co-operative credit so as to relieve the handicraftsmen of the incubus of the Mahajan—that it should provide advances for the purchase of improved appliances and new tools to be paid for by instalments—that it should arrange for the circulation of information as to markets—that it should assist the improvement of designs so as to prevent what was well described recently as "the reckless multiple reproduction of stock patterns tending to the ultimate neglect of the markets supplied"—that it should train engine drivers, carpenters, smiths, and fitters—that it should make provision for the dyeing of yarns and other materials in large quantities and their distribution from

central establishments—that it should erect factories to demonstrate Mr. Hadi's new process for the manufacture of sugar—that it should start small tanning demonstration schools—that it should purchase locally manufactured goods, and that it should do many other things to which I need not refer. *Among the suggestions that I have enumerated there are undoubtedly many ways in which Government can and in my opinion should give encouragement to industrial enterprise and so far as lies in my power I shall do my utmost to give effect to any well considered proposal that this Conference may endorse to this end.*' (The italics are ours.)

Sir John Hewett began his discussion of the question of technical education with the significant remark that 'there is probably no subject on which more has been written or said while less has been accomplished.' 'Our educational system' according to him 'is distinctly backward and requires to be brought up to date.' We think it profitable to draw attention to some noteworthy passages in this remarkable address and make no apology for quoting them.

'It must be admitted that though [the discussions on the subject] have travelled far and wide and been extended over nearly a quarter of a century, they have produced little tangible result in this province. As I have already shown the general direction of our system of education is certainly not less purely literary than when the discussions began. It is equally certain that, if it is to meet the requirements of the present day, it must be amended so as to give that variety of study declared by the Government of India more than twenty years ago to be essential in order to attract young men to commercial and industrial pursuits.'

'It does seem to me to be an axiom that there is a very close connection between education and the progress of industries and trade. Undoubtedly this truth has not been sufficiently recognised in India, and to my mind its backwardness in industries and trade is largely due to the failure to recognise the importance of organising on a proper basis its system of education.'

'Unless we do arrange that our industrial schools shall be co-ordinated with a central institution of the nature of a technological institute, we may make up our minds at once that our labours will be in vain.'

'Not only is a technological institute required for the control of any system of industrial schools that can be devised, but it is also

necessary for the purpose of commercial research. It is essential that investigations should be continuously directed towards increasing our knowledge as to the use of our vegetable and mineral products.'

'We want, I think, some local authority, or authorities, who will themselves conduct research and supervise the investigations of these matters in different parts of the province. The institute, in which these authorities would be located, should be in close communication with the great factories of the province, so as to ensure that mutual aid shall be given by the work in the institute and those employed in the management of the factories. Cawnpore naturally suggests itself as the best locality for a technological institute.'

'For the training of workmen in local industries many suggestions are made in Mr. Chatterjee's report. These include cotton and silk weaving schools, schools of design for weavers in cotton and silk, schools for dyeing, tanning, glass blowing, carpentry, and general design, and for drawing and design for metal work. I do not propose as the present stage to express any opinion as to the individual proposals made by Mr. Chatterjee, but my general impression is that schools such as he suggests must be beneficial to the industries referred to, and are in fact, essential if the industries are to reach or maintain a substantial level of success.'

'Gentlemen, when I began my address, I said that the problem before us was no light one. It is equally certain that it is of the utmost importance to this country that every effort should be made to solve it without delay. In no country that I know of have the conditions now existing in India ever presented themselves before. We have a large and expanding railway system; we have four or five great centres of industry which would compare favourably with many of the industrial centres of Europe; we have the richest possible collection of mineral and vegetable products; we have a foreign trade of nearly 212 millions sterling, much of which consists in the export of our valuable raw products in return for manufactured articles made in the United Kingdom and foreign countries. In certain of our parts you might imagine yourself in one of the bustling cities of Europe. Take a few miles' journey into the interior of the country, and you will see hardly any signs of industrial enterprise, and will at once recognize that you are in a country the inhabitants of which are far too much dependent on a single industry, *viz.*, agriculture. For such a condition of things we can find no precedent, and it is vain to look for precedent in our efforts to remedy it. Two problems set themselves palpably before us. First, we must educate people so as to divert their energies to industrial pursuits other than

agricultural. We must educate skilled labour for all our industries. We must develop among our workmen an interest in their work to replace the feeling that the day's work is only done for the day's wage; and we must bring up educated foremen, supervisors, and managers. We must encourage research into the potential value of our raw produce. Secondly, we must endeavour to overcome the shyness of capital, and success in this respect cannot be achieved unless the leaders of the people throw themselves enthusiastically into the work.'

'For my part I consider that the object to be gained is worth a heavy sacrifice. I confess that my imagination is powerfully affected by the opportunities of the present occasion. We cannot regulate the sunshine and the shower, the seed time and the harvest; that is beyond the power of man. But we can control, to some extent we can control, the disposal of the products of the earth, thereby opening new avenues to employment and spreading greater prosperity over the land.'

10. The largest area under sugar-cane is in the United Provinces and there are greater facilities there than in any other province for the development of sugar manufacture. It is, therefore, in the fitness of things that considerable attention is given to the subject by the Government of the Provinces. An account of the work done in this connection under the immediate supervision of Khan Bahadur Saiyid Muhammad Hadi, Assistant Director of Agriculture, is contained in the two paragraphs which are quoted below from the last report on the Administration of the Department of Agriculture :—

'Early in November he (Mr. Hadi) was placed on special duty for five months in connection with the Calcutta Industrial Exhibition and with sugar demonstrations in these provinces. During this period he equipped a model factory and demonstrated his processes of sugar-making from the middle of December to the middle of January.

On his return from Calcutta he attended the agricultural show at Sultanpur and started a school there for giving practical instruction in sugar-making to the students that came to the department from almost all parts of India for special training. The school worked at Sultanpur and trials of newly imported sugar machinery continued there up to the middle of February.

During the latter half of February he attended the meetings of the Board of Agriculture at Cawnpore and demonstrated his process of sugar-making there,

Early in March the sugar school and model factory were transferred to Amethi where an elaborate demonstration was given at the request of the Raja of Amethi who very kindly provided the necessary raw material and labour.

Early in April the Assistant Director attended the Industrial Conference in Allahabad where he read a paper on the revival of the Sugar Industry of the United Provinces.

In the last week of June he went to Rampur and stayed there till the end of the month to advise the state authorities about the sugar factory which they propose to work in the ensuing sugar season.

It was decided that the processes of sugar-making associated with the name of the Assistant Director should be shown at the Calcutta Exhibition in order to obtain outside criticism; it was recognized that this course would seriously hamper demonstrations in the provinces, and this proved to be the case. The Calcutta demonstrations were useful and interesting, * * *. Later in the year small-scale demonstrations were given at Meerut, Bahraich and a few places outside the provinces, and the processes were also exhibited at the meeting of the Board of Agriculture; but the chief work of the year was done at Sultanpur and Amethi where a training class was held and enough cane was available for quantitative determinations of yield on a regular working scale. I am particularly indebted to the Raja of Amethi for the facilities which he afforded in this matter. The training class attracted 43 students from all parts of India and it was a striking sight to see young graduates of Madras and Bombay competing eagerly with sons of hereditary sugar-boilers of these provinces in the production of the best and whitest product. A large programme of demonstrations in the provinces is being arranged for the ensuing year, and it has been necessary to refuse the loan of trained staff to give demonstrations in other provinces, as we have barely sufficient for our own needs.

11. The United Provinces Government have granted a scholarship to a local applicant who will learn weaving in England.

12. *Madras*.—The appointment of Mr. Alfred Chatterton for five years as Director of Industrial and Technical Inquiries, which was sanctioned by the Government of India last year, took effect early this year. He has been giving his particular attention to the introduction of improvements in lift

irrigation, handloom weaving and chrome tanning. He will thus take up industry after industry to investigate its commercial value in that part of the country. He has not been charged with the duty of making an industrial survey of the Presidency.

13. Last year the Government of India declined to sanction a scheme of technical education for the Madras Presidency sent up by the Local Government. It was elicited by questions in the Legislative Council that the latter had no intention of founding a college of technology or adopting any other large measures for the furtherance of technical education. They would only strengthen the College of Engineering, and found a well equipped College of Agriculture at Coimbatore. It is a matter of regret that the Madras School of Arts seems to be declining in efficiency and popularity.

14. The Co-operative Credit movement is steadily taking root, and advantage of its provisions is being taken to start several useful concerns in towns. The proposals for starting a State-aided Agricultural Bank, which was recommended by Sir Frederick Nicholson, is understood to be still under consideration.

15. The Government of Madras sanctioned 'the gradual extension of the Government Weaving Factory at Salem with a view to test thoroughly any experimental systems of sizing, warping or weaving which it may be desirable to try on a factory scale'; they sent Mr. G. N. Dewal, Weaving Master in the Coimbatore Jail, with a State Technical Scholarship to Manchester to acquire a sound knowledge of various types of handlooms, and of pattern-weaving; and have granted Rs. 2,500 to the National Fund and Industrial Association for an All-India Weaving Competition which will be held at Madras in February next.

The Salem Weaving Factory 'has attracted a large amount of attention all over the country and numerous hand-

weaving factories have been started on lines almost identical with those initiated at Salem. Moreover, the Salem factory has completely demonstrated the immense superiority of the fly-shuttle loom, which enables a weaver to turn out twice the quantity of cloth that can be turned out on an old type handloom.'

16. The Government of Madras have sanctioned a sum of Rs. 40,000 for the erection of a tannery at Perambur, near Madras, where the chrome process will be employed.

17. The Madras Government are proceeding with the work of placing the local fishing industry on a satisfactory basis, and sanctioned nearly half a lakh of rupees for expenditure during the current official year on special research work—almost five times the amount allotted last year. They have passed orders on certain proposals of Sir Frederick Nicholson, who for some time past has been on special duty in connection with fisheries, approving generally the proposals to establish an experimental fishery station on the West Coast and the establishment of corps and other fresh-water fish-hatcheries in suitable localities. They have sanctioned the leasing of a house in Madras to enable an officer to conduct experiments in fish culture, and they have deputed a man to Japan for the study of fisheries.

18. *Bengal*.—It will be remembered that last year the Government of Bengal expressed their disbelief in the utility of an industrial survey of the province. They seem to have changed their opinion since, for the Chief Secretary said in the Legislative Council that 'the first step would possibly be to place some one on special duty to make a general study of the industrial position and possibilities, to collect information regarding the various industries, and to endeavour to ascertain the causes of their rise or decline, and so pave the way for the establishment of the requisite technical schools.' This declaration has not, however, yet led to any action.

19. It is not known in what stage is the question of

the establishment of a College of Technology by the Government of Bengal in conjunction with the Association for the Advancement of Scientific and Industrial Education of Indians, about which we first heard rather early in 1906. The Government have made a grant of Rs 35,000 to technical education. A class for Industrial Chemistry has been opened at the Sibpur Engineering College at a cost of some Rs. 24,000 and a class for training motor car drivers at a cost of about Rs. 4,000. The Secretary of State has formally sanctioned the establishment of a Central Weaving School at Serampore, and a principal and an assistant for it are to be sent out from Europe.

20. The Committee appointed by the Government of Bengal to consider the subject of the decline of the silk industry in that province sent in their report and the Government have accepted the Committee's recommendations. These will cost substantial though yearly decreasing sums till the fourth year, after which the annual recurring expenditure will be between 12 and 16 thousand rupees. The initial cost will be borne by the Government, and it is probable that the firms interested in the industry will be asked to bear one-fourth of the recurring charges.

21. Mr. K. G. Gupta submitted his first report on the fisheries of Bengal. The final report is expected to be in the hands of the Government by the end of the year.

22. A series of informing papers on the economic condition of several divisions and districts of Bengal written by their respective Commissioners and Collectors appeared in the *Indian Trade Journal* in which testimony was borne to the good effects of the Swadeshi movement. Thus in the Burdwan division :

'The Swadeshi movement has given an impetus to the local manufacture of cloth and thus has improved the condition of the weavers. Industrial and agricultural exhibitions were held during the year in the districts of Birbhum, Bankura, Midnapore, and Hooghly mainly through the efforts of District Officers. There is

some ground for hoping that agriculture and indigenous manufactures will be improved by these exhibitions.'

The Commissioner of the Presidency division says :

'The weaving industry in the Basirhat sub-division of the 24-Parganas is reported to have received an impetus from the Swadeshi movement, but it cannot yet be said to be in a flourishing condition. In Nadia the Swadeshi movement has certainly benefited the weaving industry at Santipur and Kumarkhali. Shops and firms dealing exclusively in indigenous articles have come into existence in all important centres of trade in the district of Jessore. Cloth and sugar are manufactured on a fairly large scale in this district. On a rough computation it appears there are over 5,000 handlooms. Mr. Sen (the Collector) has found on enquiry that the number of local looms has increased and is of opinion that the sale of country-made cloth has increased by about 20 to 25 per cent. in the district. He also reports that most of the looms in use in the district are an adaptation of the fly-shuttle kind, but is not hopeful concerning the local sugar industry which cannot compete against its new rival from Java, and it would seem that foreign sugar has to a considerable extent ousted the Indian product throughout the district. * * * In Khulna also handloom weaving has received an impetus from the Swadeshi movement, but the Collector does not think that it is likely to lead to any permanent results.'

The Collector of Monghyr writes :—

'The "Swadeshi" movement is reported to have checked the consumption of imported cigarettes, * * * The Sub-divisional Officer of Dumka is of opinion that there is a great opening here for a combined tobacco curing and cigarette factory. The "Swadeshi" movement has given an impetus to the shoe-making industry in this sub-division and the local shoe-makers formed themselves into two confederacies in Dumka town, and are now turning out shoes of home-cured leather said to be quite as good as those to be had in Calcutta. Mr. Thompson thinks that there is every probability of this industry expanding and that a tannery here on modern principles would be a good venture.'

In Chota Nagpur, 'the use of foreign articles has received a very slight check owing to the "Swadeshi" movement'; 'imported cigarettes have, to a very large extent been supplanted by local cigarettes known as their "birris"; 'since the "Swadeshi" movement the extent of the use of imported sugar has been somewhat checked.'

23. *Eastern Bengal and Assam.*—The Hon'ble Mr. (now Sir Lancelot) Hare spoke as follows at a meeting of the Legislative Council of Eastern Bengal and Assam on the question of industrial development and technical education. It is not known if the pronouncement has been followed by any action :—

'In regard to industrial education I can assure the Honourable members that there is no subject in which I take greater interest, but let me also say there is none which to my mind bristles with greater difficulties. I should very much like to have in this Government a Department of Commerce and Industry, and I hope that I may yet see such a department established. We have, from time to time, reviewed our industries, and have considered a great variety of opinions as to measures we might take to improve and develop them, but I feel that if we are to deal adequately with this subject we require a whole time officer at the head of a department possessing special qualifications and experience to obtain and maintain full information as to existing industries and to carefully watch and promote all new efforts and to assist all promising attempts to start new industries with information and advice. As industries show any prospect of development, and as skilled persons are required to carry on these industries, Government might open out suitable training schools. We cannot all be omniscient, and this is a very special branch of knowledge in which the expert is very much in demand. Without such a department as I suggest, I consider that we are likely to be very much in the position of the blind leading the blind. We are likely also, without a thorough and comprehensive review of our position and without a full grasp and understanding of our advantages and disadvantages, to waste our energies over a large field of effort, and so to accomplish less than if we confined ourselves to a few selected industries.'

24. *The Central Provinces and Berar.*—The correspondence between the Central Provinces Administration and the President of the second Provincial Industrial Conference on the subject of technical education has been referred to, and is printed as an Appendix. A Committee consisting of official and non-official members has been formed to consider and settle the plan of operations in regard to industrial education and the development of industries generally in the Central Provinces and Berar. An agricultural

and industrial Exhibition is proposed to be held in November next and an industrial survey of the province will be commenced immediately. Mr. C. E. Low, I. C. S., of the Department of Agriculture, has been placed on special duty to carry out the industrial survey and organize the Exhibition.

25, The school of crafts, intended especially for blacksmiths and carpenters, has been sanctioned, and funds provided for it, amounting in all, recurring and non-recurring, to some thirty or forty thousand Rupees. Proposals have been made for a rather more expensive equipment than hitherto for introducing the use of the fly-shuttle, and the money has been provided. The rough idea is, to send a weaver and a student, in pairs from each of several selected weaving centres to Baroda, or some equally good school of weaving; bring them back here when fully qualified, and start a Provincial school of weaving. An attempt will at the same time be made to get weavers at selected centres to take up the improved methods. A scheme for training Mining Engineers is under consideration. A course would be given in Mining Engineering, analysis, and prospecting, more or less full according to the class of men who present themselves for it has been thought best at first to take a lower class of learners than they will be able to attract later. The feasibility of giving instruction in Mining Engineering depends on the acceptance of the proposal to appoint an Inspector of Mines, which has been separately made. But in any case, analysis and prospecting can be taught without any serious extra cost. There is reason to believe that the Chief Commissioner views the scheme sympathetically. Promises of scholarships for students, and of employment for passed pupils have been received from several firms. A rough scheme for instruction in certain branches of commercial chemistry, has been worked out and the authorities are ready to admit suitable pupils at any time. At the request of the Local Government, who had been

moved by a private firm of coalminers, Mr. Beckett and Mr. Low are also working out a scheme for training foreman mechanics, probably on the lines adopted in the big railway workshops, a combination of workshop experience and theoretical teaching in the hostel.

26. *Bombay*.—The attention of the Bombay Government was called to the desirability of having an industrial survey of the Presidency carried out, by the Hon'ble Sir P. M. Mehta who put a question at a meeting of the Provincial Legislative Council. Though the answer then given was not encouraging the attitude of that Government has become more favourable since then and the matter is under consideration.

27. The Bombay Government are in addition to their usual grants expending a sum of Rs. 1,67,000 on technical education during the current official year, allotments of the grant having been made to the following institutions :—The Victoria Jubilee Technical Institute and the Sir Jamsetji Jijibhoy School of Art at Bombay ; the Ranchorial Chottalal Technical Institute at Ahmedabad ; the College of Science Workshops at Poona ; the American Mission Weaving School at Ahmednagar ; the Industrial Schools at Surat, Nadiad and Ratnagiri ; and the Sardar's High School at Belgaum.

28. *Burma*.—In Burma Mr. R. W. Sindall investigated the possibilities of the paper-making industry, and the Government have offered to those desirous of establishing paper mills certain concessions which will last for a period of 21 years. The main terms of the agreements between the Government and the manufacturers are :—

'No royalty will be charged on bamboos cut and unutilised for the manufacture of pulp or paper within a period of 21 years. No royalty on manufactured paper stock will be charged for seven years, and thereafter the royalty charged will be Re. 1 per ton ; suitable sites for the erection of a factory, if available on Government land, will be granted rent free for 21 years, subject to certain

restrictions, and the free use of all roads to and from such factory guaranteed. On the other hand, the party to the agreement will be bound to a factory within two years from the date of the concession, and to keep the same working at least 120 days in each year ; to produce after the first seven years an annual output of 10,000 tons, and after 14 years an output of 20,000 tons of paper stock per year ; to render monthly statements showing the output of the mill each month and allow a full inspection of all books by the Government. The agreement will be considered null and void if operations are not commenced as provided for in the terms of the concession.'

We have quoted the above as it establishes a precedent in the matter of concessions which may properly be granted by the State to help the development of new and promising industries.

Indian States.

29. *Mysore*.—An important educational reform was carried out in Mysore during the year by the introduction of manual training in the schools of Mysore and Bangalore. This was done on the recommendation of Mr. H. J. Bhabha, Inspector-General of Education, who was convinced of its value by his study of the systems of primary and technical education in Europe and America where he spent his furlough. The cost of the scheme is roughly estimated at Rs. 40,700. Technical and industrial education in the State made fairly good progress during the year. Additional grants for expenditure were sanctioned for the Industrial and the Engineering Schools in Mysore and the six other quasi-Government Industrial and Weaving Schools in the State. New monthly grants were also sanctioned in aid of the private Industrial Schools at Bagepalli and Srinivasapur. A new Commercial School was opened by the Wesleyan Mission at Mysore, and Government sanctioned a lump sum grant of Rs. 900 for apparatus required for the school. The students of the Mysore Engineering School were authorised to be taken out by their teachers occasionally to important Engineering Works in the State with a view to give them

better practical training. Fourteen Technical Scholarships were granted to Mysore students to enable them to undergo training in the Technical and Industrial Institutions of Bombay and Madras. A special grant of Rs. 300 was sanctioned by Government to start a small Demonstration Farm in connection with the Anglo-Vernacular School at Dodballapur to teach practical agriculture to the students. It has been resolved to grant the Damodar Dass Charity Scholarships for advanced Scientific Research and Technical Education. The assistance rendered by the Mysore Government to the Tata Institute is well known.

30. To help to revive the local weaving industry which is fast falling into decay, the Mysore Government passed orders : '(a) Authorising the formation of a Weavers' Co-operative Society confined to the residents of Bangalore City ; (b) promising to help the society by advancing money up to Rs. 2,000 free of interest, and also to supply it free of cost with specimens of improved looms and appliances to be tried by individual members, and adopted if found suitable ; and (c) requesting the Inspector-General of Education in Mysore to provide suitable facilities for the elementary instruction of weavers' children in day and night schools in Bangalore City.' It will perhaps be interesting to state in this connection that the number of weavers in Bangalore City, which according to the last Census was 10,493 has since been reduced to not more than 3,000 as a consequence of the visitation of plague. An exhaustive memorandum on the condition of the weaving industry in Bangalore prepared by Mr. M. A. Sampath Iyengar, Superintendent of the Hole-Narasipur Weaving Institute, was published in the *Modern Review* of Allahabad and it will be found interesting and suggestive.

31. The means by which the Mysore Government propose to promote the silk industry of the State are explained in the following note :—

' The Mysore Government consider that a better way of utilising Mr. Tata's silk farm in Bangalore to the best advantage would be to get the young men engaged in the silk industry in the Province to go through a regular course under the guidance of Mr. Odzu, the Japanese expert in charge of Mr. Tata's farm, so that, on return to their villages, they may be the means of introducing improved methods in the different centres of the silk industry. One of the assistants to the Agricultural Chemist is to be sent to the farm to study the various methods with a view to bringing them to the notice of the silkworm rearers in the important centres of the silk industry in the districts of Kolar, Mysore, Bangalore and Tumkur. The Agricultural Chemist to Government is to make the necessary arrangements. The notes of Mr. Mukerjee, the Bengal silk industry expert, are to be translated in full into Canarese and Hindustani in the form of leaflets for distribution among the silk rearers in the centres named. The instruments and appliances referred to in Mr. Mukerjee's notes are to be supplied for the Tata Demonstration Farm in Bangalore and for sale to silkworm rearers out in the districts. It is felt that it is not clear that the demonstration of the Bengal system of reeling is still going on in Bangalore, and the Inspector-General of Education is to report whether the services of a reeler from Bengal may not with advantage be engaged for a period of six months.'

32. A company called the Bangalore-Chickballapur Railway Co., Ltd., has been started at Bangalore, with a capital of Rs. 12 lakhs divided into 48,000 shares of Rs. 25 each, with the object (among others) of constructing, equipping, and working a line of Light Railway on 2'6" gauge between Bangalore and Chickballapur, a distance of 40 miles, to begin with, and eventually to extend the line towards Madanapalli *via* Sidlaghatta and Chintamani on one side and towards Hosur *via* Anekal on the other. The most important feature of the Company is the offer by the Government of Mysore of a guarantee of four per cent. interest on the Capital expenditure of the Company. Other concessions given by the Government are the free grant of Government lands and the permission to utilise the existing Government roads, wherever the gradients admit of such roads being used, for the

Railway. Further, the Government have authorised the giving of interest on capital during construction charging the same to Capital Account as is usually done. The Hon'ble Mr. Vithaldas D. Thackersey is *ex-officio* Managing Director of the Company.

33. The Mysore Government held an Industrial and Agricultural Exhibition in Mysore City in October on the occasion of the Dussehra. The primary object of the Committee was to impart to the Exhibition a purely educative character and to bring together articles, machinery and processes, the uses of which might advantageously be brought to the notice of the ryot, the artisan and the manufacturer by actual demonstration. A cattle and sheep show was attached to it. The Exhibition was open to all exhibitors throughout India. It was opened with great ceremony by His Highness the Maharajah. In the course of his speech His Highness said that it was not to be expected that exhibitions of this kind should have immediate or revolutionary influence on the agriculture and industries of the country ; but they offered to all classes an opportunity of seeing what their neighbours were producing. To craftsmen they were of special use in indicating the directions in which their skill might be usefully directed, whilst distributors might learn from them of new markets on the one hand and, on the other, of new sources of supply. Lectures on agricultural and industrial subjects by persons specially qualified to handle them were a useful adjunct of the Exhibition. This Exhibition is to be an annual Dussehra fixture.

34. An association by name Sri Krishna Rajah Agricultural and Industrial Association was started at Mysore, on the 3rd November, with a capital of Rs. 50,000, mainly through the exertions of Mr. A. Rangaswami Iyengar, Revenue Commissioner of the State. The Association was registered under the Mysore Co-operative Credit Societies Act and it has been formed into a limited liability company. To ensure responsibility in the workers of the Committee it

was resolved that not less than three-fourths of the General Committee should be shareholders and the rest ordinary members paying yearly subscriptions. Among other resources of the Association will be grants, subsidies, etc., from the Mysore Government. The two main lines on which work is resolved to be done are (1) propagandism and (2) practical demonstration. Under the first, leading papers, journals and the transactions of similar Associations elsewhere will be subscribed for, lectures will be arranged, and pamphlets on useful methods and ways issued ; also the latest and most suitable innovations in agriculture or industry will be sought for and adapted to the requirements of the country. Under the second heading experimental and model farms will be opened in one or two places as also establishments for petty artisan work, all under the supervision of experts, both much travelled and suitably educated. Since the concern is to be worked on a co-operative basis, best seeds, ploughs, handlooms or other machinery will be got for the members whenever required and also indigent members or any member in times of scarcity can obtain needed loans in kind or money to tide over the difficulty. Money invested in the share capital of the Association will not be available to private debtors of members.

35. *Baroda*.—His Highness the Maharajah Gaekwar's earnest and intelligent solicitude for the material development of the country is well-known. His Highness brought down with him last year from America Mr. R. C. Whitenack to advise him on matters relating to industrial development. A separate Department of Commerce and Industry has been created this year and Mr. Whitenack placed in charge of it.

36. In the course of a characteristic speech delivered on the occasion of opening a new Cotton Mill at Baroda, His Highness the Maharajah announced his decision to 'have in the course of a few months an Industrial Survey of the State with a discussion of existing conditions, the

projects of growth and some suggestions as to policies to be pursued.'

37. Education, as well technical as general, has always found an eager friend in His Highness the Gaekwar, and it has been promoted during this year with the same unfailing vigilance as ever. The special attention paid to the improvement of handloom weaving has been similarly continued. In the matter of the silk industry the late Mr. N. G. Mukerjee, who was specially engaged by His Highness to investigate its possibilities in Baroda, drew up a scheme which included the establishment of two schools at Viyara and Songadh where students should be taught the methods of both silk-worm rearing and silk-reeling, the starting of mulberry plantations, the publication in Gujarati of a manual of practical instructions, and ultimately the foundation of a reeling factory on a large scale. There need be little doubt that all steps requisite to the successful building up of the industry will be taken by His Highness's Government. The state contributed Rs. 8,000 to the Gaekwar Umbrella Co., which was started in Baroda during this year.

38. *Patiala*.—The Patiala Durbar sanctioned the formation of the Patiala-Jakhal Railway Company, Limited, with a capital of 15 lakhs divided into 15,000 shares of Rs. 100 each. The Durbar guaranteed an interest of $4\frac{1}{2}$ per cent. with an option of purchase by the State after 50 years. The State also undertook to take all the unsold shares and to sell them again to applicants of the authorised class, *viz.*, subjects or officials of the State, at a reasonable price. The State has also, by a provision in the Memorandum and Articles of Association, agreed to purchase any necessitous shareholder's stock at the market value. On these conditions the subjects of the State have readily come forward to apply for the shares. Mr. Biddulph, the Accountant-General of Patiala, in his note on the project observes :—

'The terms which are contained in the Prospectus and which have received the ready assent of the Council of Regency meet all

the requirements of the investing public as testified to by a general consensus of agreement. Apart from the mere question of relieving the Government of the State of the necessity for producing or borrowing funds for the Railway, my chief object in promoting the Patiala-Jakhhal Railway Company, Limited, has been to encourage the subjects of the State to devote their capital to the development of their own resources ; and to engender a feeling of self-help and self-confidence which should tend to promote a readiness to provide for their own requirements. Looked at from the point of view merely as a financial transaction the Durbar obtains funds for the prosecution of the Railway scheme without the necessity for utilising its working balance which is not more than is reasonably sufficient as an insurance against short crops or famine, or, on the other hand, raising a loan the interest on which would go outside the State.'

39. *Kashmir*—During last cold weather the Maharajah of Kashmir inspected several educational institutions of the Punjab in connection with a scheme His Highness has had in view for improving the educational department of his own State. During this tour, the Maharajah was impressed by his visit to the Mayo School of Art, Lahore, and invited the Principal of the Lahore School, Mr. Percy Brown, to spend a short time in Srinagar in order to discuss the practicability of a scheme for art and technical education being put into effect at an early date in Kashmir. Mr. Percy Brown has submitted 'a very complete and practical scheme which has met with general approval,' and it is anticipated that before long, the State will possess an art and technical institution conducted on the most approved lines.

40. In Kashmir the silk industry is giving employment to some 70,000 persons, and the number of rearers is steadily increasing. During the year 1905, the raw silk produced in the State yielded a profit of £ 28,139, or 58½ per cent. on invested capital. Last year a record crop of cocoons was produced, and it is anticipated that with better prices, the profits will exceed those of the previous year. Kashmir raw silk is said to meet with a very ready sale in the Lyons market in France.

41. *Gwalior*.—An English company has recently obtained a concession from the Maharajah of Gwalior to build a cotton spinning and weaving mill in the State. The concession is for a period of 14 years, and the capital of the Company is reported to be Rs. 40,00,000. This is the first textile mill in Gwalior State, and as 'the concessionaires are men of experience, the venture has every prospect of success.'

42. *Banganapalle*.—A syndicate has been formed to work the concession in the Banganapalle State, eighteen square miles in extent, granted on favourable terms by the Government of India to Khan Bahadur Waljee Laljee. The property is said to contain valuable deposits of copper, which upon analysis, show 23 per cent. of the metal. The property is also said to be diamondiferous and to contain manganese. Mr. Wetherell, when acting as State Geologist of Mysore, visited the properties, and reported favourably on them.

43. *Morvi*.—His Highness the Thakore Saheb of Morvi has under consideration an important scheme of technical education which may be carried out to at an early date.

PART II.

SECTION B.

Industrial Activity of the People.

BOMBAY.

1. The formation of the Tata Iron and Steel Company is the most important recent event of industrial India. It seemed at one time that though the enterprise owed most to the genius of an Indian captain of industry the capital would be mostly English and the Directorate would be in England. But these fears luckily proved groundless, and well-wishers of this country have the satisfaction of feeling that the Iron and Steel Company is entirely a Swadeshi concern. The *Times* remarked in a recent issue, with perfect truth as every one knows, that the capital of Bombay 'has pursued the path of industrial development with admirable concentration.' 'It has long been' the *Times* wrote, 'a vast hive of genuine Swadeshism, possibly without quite knowing it, and apparently not much caring to spread the fact abroad. Its forest of factory chimneys, its great rows of busy mills, were largely built with Indian capital, and are to a great extent controlled by Indian owners.' Then the *Times* paid the following tribute to Mr. Tata :—

'Prominent among these was the late Mr. Jamsetjee Tata, a Parsi of remarkable capacity and singular prescience, who in his day did more than any other man in India to assist industrial development and to encourage technical education. Before he died, he gave the magnificent sum of £ 200,000, to found an Indian Institute of Science, which is now in process of inauguration at Bangalore. He devoted himself for years, and until his death, to a scheme for creating an iron and steel industry in India. His purpose was steadfastly pursued by his sons and is now on the verge of fulfilment. A capital of nearly a million and a half sterling has been subscribed for the purpose of starting iron and steel works at the Sini Junction, on the Bengal-Nagpur Railway. The money was almost entirely found by Indians, and the directorate is exclusively

composed of Indian & businessmen resident in Bombay. Simultaneously, a scheme devised by the late Mr. Tata for collecting the heavy rainfall on the Western Ghats, and utilising it for working the Cotton Mills of Bombay, has been carried to an advanced stage.'

The capital of the Company is Rs. 2,31,75,000, divided into three classes of shares : (1) 200,000 ordinary shares of Rs. 75 each ; (2) 50,000 preference shares of Rs. 150 each ; (3) 22,500 deferred shares of Rs. 30 each. The preference shares are to carry interest from 1st April 1908. All the ordinary shares and most of the preference shares have been taken up.

The Company is formed for the purpose of erecting in India blast furnaces, open hearth steel furnaces, rolling mills, coke ovens, and other plant necessary for the manufacture of pig iron, steel rails, bars, plates, etc., and for these purposes to acquire mining rights over very valuable and large deposits of iron ore. The plant that is to be erected will yield an output of 120,000 tons of pig iron and the conversion of 85,000 tons thereof into 72,000 tons of finished steel ; there is thus every probability of a ready market on the spot for the whole production.

Plant will be established for the manufacture of sulphuric acid as one of the bye-products. Immediately only so much of the acid will be manufactured as is required by the Company itself for producing sulphate of ammonia. The importance of local manufacture of sulphuric acid cannot be exaggerated, as according to Mr. Holland the loss to India arising from the advantage possessed by England in cheap sulphuric acid is over 10 millions sterling. ' With cheap sulphuric acid, the continued and disastrous export of phosphates in the form of bones from this country, would be checked. A growing demand for the acid will resuscitate on a modern scale the once considerable copper-smelting industry in South India and in Rajputana, make the copper-bearing rock in Kulu, Garhwal, Nepal, Sikkim and Bhutan commercially workable, and reduce the large copper and brass bill, amounting to £813,700 per annum, which the country pays to foreign manufacturers.'

2. The Swadeshi movement has had a very beneficial effect on the progress of the textile industry. The losses accruing from the dulness of the China market, where the Indian mill-owner has to face the competition of the Japanese, have been counterbalanced by the increased demand in India itself and the position is thereby rendered distinctly favourable as admitted by those connected with the mill industry itself. The Swadeshi movement has led, too, to the establishment of more new mills than would have otherwise been the case. These are the Broach Industrial Cotton Spinning and Weaving Co., Broach, capital Rs. 7 lakhs ; H. H. the Maharana Shri Ajitsinghji Dharangadra Mills Co., capital Rs. 5 lakhs ; Fazulbhoy Mills, Bombay ; Srinagar Weaving and Manufacturing Mill, Ahmedabad ; Ahmedabad Astodaya Manufacturing Mill, Ahmedabad ; Jam Shri Ranjit Singjee Spinning and Weaving Co., Bombay, capital Rs. 8 lakhs ; Sri Rasulkhan Mills Co., Bombay, capital Rs. 10 lakhs ; Haripur Spinning and Manufacturing Co., Ahmedabad ; Ahmedabad Swadeshi Spinning and Manufacturing Co., Ahmedabad ; Industrial Mills Co. ; Maharana Bhowsingji Mills Co., Bombay, capital Rs. 10 lakhs. The foundation was laid of the Sri Krishna Mills at Ahmedabad in June. The Albion Spinning and Weaving Company is to be started shortly at Bombay with a capital of 15 lakhs, the value of each share being Rs. 1,000. Shares worth Rs. 10 lakhs have been sold. Messrs. Narottam Morarjee Gokuldas and Govardhandas Khatau are among the Directors. Weaving sheds were added to the Bombay Cotton Mill, the Elphinstone Mill, Bombay, and the Ahmedabad Merchants' Mill.

3. Besides the above, we have several other concerns to record in connection with the textile industry. It was resolved in the month of June by several respectable capitalists of Sind that in view of the possibility of producing good coarse cloth from Sind cotton, a Joint Stock Mill Co. be started. The Nadiad Silk, Woollen and Cotton Handloom Weaving Co., Ltd., was started at Nadiad in January with

a capital of Rs. 50,000. The Company have manufactured 30 looms and expect to turn out 20 more within the next six months. The looms are of special pattern, being fly-shuttle looms with dobby attached to them so that [they] are able to make any kind of cloth whether plain or bordered. Several varieties of cloths are manufactured by the Company. A Weaving Company was started at Poona under the designation of the Poona Swadeshi Weaving Co. The Swadeshi Lala Co., Ahmedabad, capital Rs. 1 lakh, has for its object trading in handlooms. The Swadeshi Calico Printing Co., Ltd., Bombay, was started with a capital of Rs. 5 lakhs, divided into 10,000 shares of Rs. 50 each. The Company claims to be the first of its kind in the whole of India. Its chief objects are (1) to establish a mill for bleaching, dyeing and calico printing of cloths on a commercial basis and to successfully compete with those that are at present supplied by foreign countries, and (2) to establish a workshop and a chemical laboratory for making experiments necessary to attain the up-to-date developments of the business and for training the workmen as well as outsiders wishing to be benefited by it. The Swadeshi Hosiery and Manufacturing Co. was started at Bombay with a capital of Rs 3 lakhs. Messrs. Desai & Co. started the Swadeshi Dyeing Factory at Bijapur. The Luxmi Narayan Handloom Works at Shirgaon in the Thana District turn out 'fine and durable' cloth of several descriptions. Another handloom factory was started at Raibagh in the Southern Maratha country under the guidance of Mr. Kashinath Pant Dandekar, L. T. M. The Maharajah of Kolhapur promised a donation of Rs. 6,000 to the factory. The promoters of the handloom factory which was started at Dhulia last year intend to convert it into a limited liability company. Two enterprising pleaders of Bijapur (Messrs. Raghavendra Rao and Panduranga Rao Desai) started a Calico Printing factory at Bijapur and it is said that success has attended their efforts. The Belgaum Loom and Industrial Machine Works was started by Messrs. Nilajkar and Khatau, two enterprising

young men of Belgaum who returned from Japan after completing their studies. They prepare handlooms and their accessories and within a period of two months of their starting, 22 looms have been made. They are after the improved Japanese pattern. Pupils are taught weaving free of any charge, but they are required each to purchase one loom. From 20 to 30 yards of cloth is turned out daily. Handloom classes were also opened at Nasik and Ratnagiri. The Bharat Press Co., Bombay, capital Rs. 2½ lakhs, the Nimar Cotton Co., capital Rs. 2 lakhs, the Malwa Cotton Co., capital 1½ lakhs, and the Mahadeva Cotton Press Co., capital Rs. 60,000, and the Jhotana Ginning Co., Ahmedabad, gin and press cotton.

4. The Indian Mercantile Insurance Co., Ltd., was started at Bombay with a capital of Rs. 50,00,000 divided into 50,000 shares of Rs. 100 each. This company was formed for the purpose of carrying on the business of Fire Insurance in all its branches in India. Power is reserved to carry on with the sanction of the general body of shareholders, business in Marine Insurance.

5. The Swadeshi Bank was started at Dharwar with a capital of Rs. 1 lakh, the chief object being to encourage manufacturers and artisans. The Pioneer Co-operative Credit Society, Ltd. (Urban), was started at Bombay with a capital of Rs. 1 lakh divided into 1,000 shares of Rs. 100 each. The society was established on the co-operative basis, to enable the members of it to obtain from its funds loans on easy terms and thus to assist them in starting small trades, in entering into useful professions, and in carrying out other practical objects. Messrs. A. V. Jayakar Co. are the secretaries and managing agents.

6. The Oriental Mining Co., Ltd., was started at Bombay with a capital of Rs. 5 lakhs divided into shares of Rs. 100 each. One of the Directors is Mr. Maniklal Ghelabhai, who owns some 24 manganese mines in the Goa territory.

7. Among other new enterprises the following may be

noticed. The Deccan Match Factory was started at Karad in the Satara District by Messrs. Shiralkar and Bahulikar. The capital of the Company is Rs. 1 lakh divided into 1,000 shares of Rs. 100 each. The Belgaum Match Manufacturing Co., was started by Messrs. Nilajkar and Khatau with a capital of Rs. 25,000 for making matches, suitable wood for which is available in the district. The Shampa Bhavan Match Factory at Sholapur was started for the manufacture of grass matches. The machine for cutting the grass is prepared by Kirloskar Brothers of Belgaum and the other machine for dipping the matches in phosphorus is prepared by a maistry in the factory. The Deccan Grass Match Factory is at Poona.

Mr. Kamble opened a small Umbrella Factory at Poona in the month of January. All the parts of the umbrella are locally manufactured with the exception of ironwire required for the frame work which is imported from England. The workshop turns out by hand power about 50 umbrellas per day.

The Soap and Candle Factory at Baramati (Poona District) was started by Seth Tilokchand Hirachand Jain and Co. The products of the factory have been pronounced to be fairly satisfactory. A soap factory was started at Hubli by Laxmi Narayan and Co. The Indian Soap and Candle Factory, Bombay, capital Rs. 1 lakh, manufacture soap, candles and perfumery.

The Gujarat Pencil Factory at Zadeshwar, district Broach ; the Pencil Factory at Hubli started by Tabib Brothers ; Shri Rajaram Pencil Factory, Fanaswadi, Bombay, started by Narayan Vinayak Athalye ; the Pencil Factory at Islampore started by Mr. Dalvi, Pleader, are the pencil factories started during the period under review in the Bombay Presidency. Of these the factory at Fanaswadi, Bombay, turns out 1,000 pencils daily, and is expected very soon to turn out 5,000 daily. Almost the whole machinery was manufactured locally.

The Cigarette Factory at Ahmednagar ; the India_n

Condensed Milk Co. at Chaklasi (Gujarat)*; the Oil Mill at Karad (Satara District) started by Ramakrishna Naik Kale ; the Indian Cement Syndicate, Bombay, capital Rs. 30,000, which manufactures and sells cement ; the Bombay Milk Supply Co., Ahmedabad, capital Rs. 20,000, which trades in milk, butter, etc., are other manufacturing concerns started during this period.

Mr. Bhaskar Vasudev Sathe, Pleader at Dhulia, has started a Flour and Oil Mill.

8. Shops for storing and selling indigenous goods continue to be started at different localities, thanks to the progress of the Swadeshi movement. Among these are the People's Swadeshi Stores Co., Hyderabad (Sind), capital Rs. 20,000 ; the United Swadeshi Trading Co., Bombay, capital Rs. 50,000 ; the Borsad Swadeshi Sahayak Mandal of Borsad Bazaar, Bombay, capital Rs. 5,000 ; the Indian Stores, Karachi, capital Rs. 25,000 ; the Swadeshi Padartha Sangraha, Dharwar, capital Rs. 20,000 ; the Satara Swadeshi Commercial Co., Satara, capital Rs. 20,000 ; the Deshi Stores Co., Shikarpur, Bombay, capital Rs. 10,000. The Bombay Swadeshi Co-operative Stores Co., which was registered as a limited liability company last year with large capital and an influential directorate, is thriving well and doing very useful work.

9. Very valuable educational work has been done during the year in the Victoria Jubilee Technical Institute at Bombay. The courses of instruction which have been enjoyed by students included mechanical engineering, textile manufacture, electrical engineering, sheet metal working and technical chemistry, and in all of these branches of technical education, the student is thoroughly grounded in the subject he takes up from the practical point of view. The number of candidates seeking admission

* The condensed milk prepared by this Company was examined by the Government Chemical Analyser and certified to be superior to the article imported from Switzerland. The factory is supervised by Professor Gajjar of Bombay.

continues to be considerably in excess of available vacancies, in spite of the higher preliminary education now demanded. The higher standard for admission to the classes has resulted in an appreciable improvement in the quality of the students entering the Institute, as also in reducing to a minimum the number of those who fail to go through the complete course of instruction. The number of students on the rolls on the 31st March 1907 was 387 as compared with 340 last year and 315 the year previous. In order to meet the demand for trained technical teachers, which the growth of small technical schools in the country had created, and which was expected steadily to increase, the Board instituted a small number of Fellowships of the value of Rs. 50 per month. Six of these have been awarded in the year under review and the Fellows assist the teacher in their class work and, at the same time, carry on an additional course of study. One of the chief items of interest during the past session was the opening of the Central Electric Power Station in connection with the electrical engineering branch of the Institute. The station was opened by H. E. the Governor of Bombay, Lord Lamington, in February last.

10. Some gentlemen of Kurundwad in the Southern Maratha Country have hit upon the expedient of an " Industrial Lottery " with the object of obtaining funds for erecting a Sugar Manufacturing Factory. The result will no doubt be awaited with curiosity.

11. The Swadeshi Vastu Pracharini Sabha of Bombay has been working these two years for the promotion of Swadeshim in the country. Under its auspices was held on All-India Swadeshi Conference at Calcutta about the time of the Congress under the presidency of the Hon'ble Nawab Saiyid Muhammad Sahib Bahadur of Madras. A Provincial Swadeshi Sammelan was held at Surat at the time of the last Provincial Conference. The Sabha took advantage of the fair at Pandharpur in October last to popularise the Swadeshi movement by means of lectures and preachings.

BENGAL.

12. The Hindustan Co-operative Insurance Society, Ltd., was started at Calcutta with a capital of Rs. 1 crore divided into shares of Rs. 100 each. It has made a speciality of small insurances and it is said that it affords facilities even for the pettyest of ryots and wage earners to make a suitable provision for their families in the event of death or their own comfort in old age. Two other Insurance Companies are the National Indian Life Assurance Co., Ltd., Calcutta, under the auspices of such exalted personages as the Maharajahs of Baroda and Cooch-Bihar, and the National Insurance Co., Ltd., Calcutta. The capital of both the Companies is Rs. 10 lakhs each. The latter Company has done very satisfactory work since its start. It was floated in March last and in these eight or nine months policies to the value of Rs. 15 lakhs have been recorded.

13. The Bengal National Bank, Ltd., was started under influential auspices with a capital of Rs. 50 lakhs.

An Association was started at Bankura under the name of the Bankura Central Co-operative Society, with the following objects.—(a) To create funds to lend out to its members or to be invested for the benefit of its members in accordance with the Co-operative Credit Societies Act. Such investment may take the form of loans to rural credit societies and also, with the permission of the Local Government to urban credit societies; (b) to encourage thrift, self-help and mutual trust among its members who belong to the industrial class, and with this object, (1) to obtain for such members raw materials at wholesale rates; (2) to make advances of cash and material at reasonable rates of interest; (3) to improve the standard of manufacture, and (4) to sell the finished product on behalf of members, charging a fair commission on sales; (d) to act as an organization society for the introduction of Co-operative Societies among the agriculturists and artisans of the district. The capital of the society has been fixed at Rs. 10,000

for the present, to be raised by 1,000 shares of Rs. 10 each. The society is registered under the Co-operative Credit Societies Act. The capital would be gradually increased with the expansion of the sphere of action which would be limited to the district itself.

The Gaya Bank and Trades Association, capital Rs. 50,000; the Ananda Bhandar, Rangpur, capital Rs. 20,000, and the Sonamarg Lakshmi Bhandar of Sylhet, capital Rs. 20,000 are other concerns which do banking business.

14. The several steamer services started by Indians furnish additional proof that Bengal is forging ahead in business affairs, as it is already advanced in matters intellectual. The East Bengal River Steam Service was started with a capital of Rs. 6 lakhs. Raja Sreenath Roy, Babu Janaki Nath Roy and the Hon'ble Rai Sitanath Roy Bahadur are the Managing Agents. Babu Brojolal Roy started the Bhagyakul Steam Service with a capital of Rs. 1,24,000. Babu Muralidhar Roy is the Managing agent. Besides these the Bikrampur Flotilla Service was started by Babu Benodilal Roy and Brothers, and the Lakshminarayan Steam Service by Babu Harendra Lal Roy. The East Bengal River Steam Service Co. also started a workshop under the name and style of the East Bengal Engineering Works at Cossipore to repair their vessels and also to do outside work. All these concerns are due to the enterprise of the Bhaggakul Roy family in the district of Dacca.

15. The Indian Cotton Cultivation Co., Ltd., was formed for growing cotton. It acquired a plot of 250 bighas in the district of Birbhum, about 10 miles to the west of Rampore-hat, where cotton is being cultivated. The capital of the Company is Rs. 10,000 divided into 2,000 shares of Rs. 5 each.

16. The determination with which Bengalis have taken to the Swadeshi movement has in no other field produced more gratifying results than in the industry of weaving. The impetus it has given to handloom weaving is remarkable. We have cited official testimony to this fact in the foregoing

Section of this Report. The necessity for starting power-loom mills has not totally escaped attention either. The successful working of the Bengal Luxmi Cotton Mill may be mentioned as an instance in point. The Desi Cotton Mills, Ltd., of Calcutta, were, it is true, promoted by Messrs. Andrew Yule & Co., but the bulk of the shareholders are understood to be Bengalis. A plant of 450 looms has been laid down in this mill and 250 looms are working now. It is intended gradually to lay down a plant of a thousand looms. The factory of the Calcutta Weaving Company was opened at Howrah. Arrangements have been made for the accommodation of 80 looms. Fifty looms are at work at present. The National Spinning and Weaving Co. of Bengal was started with a capital of Rs. 20,000. The Surma Valley Weaving and Trading Co., Sylhet, was started with a capital of Rs. 20,000. The business of trading in indigenous goods is combined with weaving. A company under the name and title of the Bengal Hosiery Co. was formed at Calcutta with a capital of Rs. 2 lakhs. The Madanganj Pressing Co., Bengal, capital Rs. 1,50,000, is for pressing cotton, also jute and hides.

17. The Bengal Agricultural and Dairy Farm, Ltd., capital Rs. 5 lakhs divided into 5,000 shares of Rs. 100 each, was started 'with the object of providing an honourable means of livelihood by farming, to the young men of this country.' It was proposed to partly purchase and partly to lease out 1,000 bighas of land at Kanchrapara and Saptagram (30 miles from Calcutta) and start cultivation and dairy farms. The Company would further arrange to give a practical training to those young men who would serve as apprentices to the farm. The expert members of the Board will make periodical visits to inspect the working of the farm and to give training to the apprentices for farming. It is stated that the Company intends to start such farms in every district with a view to making them popular. Rai Saheb Gopal Chandra Chattopadhyaya, retired Executive Engineer, is the Managing Director.

18. The Bengal Pottery Works at Baranagar were started with a capital of Rs. 21,000 ; the Chairman of the Board of Directors being Rajah Peary Mohan Mukerji. The Manorama Candle Factory was started by Babu Nagendra Nath Mazumdar, who learnt the arts of candle-making and pencil manufacture in Japan. Its notable feature is that Mrs. Mazumdar is in charge of the business, all the details of which are worked by herself and a number of other women. The Barisal National Oil Mills were started at Nalchitti with a capital of Rs. 75,000. A large comb factory was built at Cuttack under the direction of Mr. Howard Lucy. The factory is said to be fitted with the latest machinery and an expert in comb-making has been secured from a well-known Scottish firm. ' This factory is the first of its kind in India, and is expected to be in full swing by the beginning of the new year.' The 'Bande Mataram Factory' for the manufacture of matches was started at Calcutta by the Hon'ble Dr. Rash Behary Ghose and it is under the management of Messrs. P. C. Roy and A. C. Ghose who had been sent to Japan by the Association for the Advancement of Scientific and Industrial Education, to learn match-making. The 'Small Industries Development Company' was started by this Association with a capital of Rs. 4 lakhs for manufacturing pencils, buttons and other industries which do not require large capital. It is hoped that several of the students sent abroad by the Association will be employed in this concern. The Rangpur Tobacco Company, capital Rs. 1 lakh, is for manufacturing cigars, cigarettes, snuffs and other products of tobacco. Then we have the Jalpaiguri Silpa Samity, with a capital of Rs. 50,000 and the Dacca Silpa Samity with a capital of Rs. 20,000. There are besides, the Kansat Trading Co., Malda, capital Rs. 20,000 ; the Nowgong Trading Co., Nowgong, capital Rs. 20,000 ; the Kamrup Industrial and Trading Co., Gauhati, capital Rs. 50,000 ; the Durbhanga Trading Co., Durbhanga, capital Rs. 20,000, and the Tripurajatiya Bhandar Co., Comilla, capital Rs. 30,000.

19. We pass on to the work done in Bengal in further-

ance of scientific, industrial and commercial education. Foremost of the institutions devoted to this object is the Bengal Technical Institute. Particulars of the instruction imparted here were given in last year's report. Here it is only necessary to say that the institution is making healthy progress. Donations to the Institute amount to Rs. 76,300 and monthly subscriptions to Rs. 3,487. Mr. Dadabhai Naoroji and His Highness the Gaekwar visited the Institute and expressed themselves pleased with what they saw.

It is pleasing to note the attention bestowed on scientific education and manual and technical training at the Bengal National College and School. There are 17 lecturers in the Technical (including Scientific and Commercial) Department, the budgeted grant for the current year for the instruction staff being a little over Rs. 1,900 per month. Rs. 25,000 were budgeted for the current year for the workshops attached to the Technical Department and the Laboratories. Besides this, a special subscription of Rs. 1,000 and upwards was started for the expansion of the Laboratories and Workshops, and Rs. 12,000 were subscribed for the purpose even early in the year. Particulars of the courses of instruction adopted in the Technical Department of the Bengal National College are given in Appendix VII.

The Association for the Advancement of Scientific and Industrial Education of Indians has, as usual, done exceedingly good work during the year. Several students sent by it to foreign countries returned after completion of their studies and are usefully employed. Forty-eight of them were still abroad pursuing their studies at the beginning of this year. And so many as 96 were sent afresh this year. This is splendid work, on which the Hon'ble Babu Jogendra Chandra Ghose, the Secretary, and his fellow-workers, deserve to be congratulated. The financial position of the Association is satisfactory.

Of the young men who returned to India after completion of their education, Mr. Satya Sundar Deb successfully started the pottery works and is getting Rs. 150 a month. Messrs. P. C. Roy

and A. C. Ghose started a match factory on a salary of a Rs. 100 a month each and commission of 30 per cent. on the profits. Mr. Amarendra Narayan has been engaged at Binulipatam pencil factory on a salary of Rs. 100 and a share in the profits. Mr. I. B. De has been appointed Agricultural Officer in the Cooch Behar State on Rs. 500 a month with allowances and Mr. K. E. Nandy has been appointed District Engineer on a salary of nearly Rs. 500 a month with allowances.

The Indian Association for the Advancement of Science, Calcutta, which was founded by the late Dr. Mahendra Lal Sircar, has done a year's good educational work. During the year, the workshop of the Association has turned out several new instruments such as a set of three systems of pulleys, one wheel and axle, a lever with several divisions and weight to illustrate the result of parallel forces and the leverage also and an eye-piece tube for $3\frac{1}{2}$ inch telescope to carry Brown-ing's spectroscope. Several tools and implements were also prepared for lathe itself without purchasing them from the market.

The Calcutta Commercial Institute was started at Calcutta this year and Shorthand, Type-writing, Book-keeping, etc., are taught there. Mr. N. K. Mitter, M.A., is the Principal and is assisted by a staff of educated and efficient teachers.

A society, under the title of Silpa Samity, was registered under the Indian Companies Act, with the object of promoting industrial education among the women of Bengal. The society has taken over several technical schools for girls from private management to be worked on an extensive scale. It was under contemplation to start a free day school, where technical and industrial instruction would be given to girls.

The Convent Lace School at Ranchi, Chota Nagpur, is doing useful work in the way of giving the women and girls of the flock a practical education with a view to affording them a more lucrative occupation than that usually adopted by the women of the district, and one which would not interfere with their domestic duties. The Ranchi

Convent already possessed a member who had studied and worked in a Belgian school of lace, and in 1905 the first local institution was founded with three pupils and a little later, a man trained in the lace industry came out from Belgium to take charge of it. Since that date the school has been growing in usefulness and popularity, so that now it may be regarded as a firmly established concern with a future before it. All that it needs to ensure its prosperity is a grant-in-aid from the Education Department.

20. Industrial and Agricultural Exhibitions were held during the year at Balasore, Kendrapara and Angul in Orissa, at Hooghly, at Jhenida and some other places mentioned in Section A. At the Kendrapara Exhibition a Silver Medal and cash prize were awarded to one of the muslin fabric weavers of Gulnazar in the Cuttack District as an encouragement for his first adopting the fly-shuttle to the country loom.

21. Babu Purnendu Narayan Sinha, Secretary, Bihar Exhibition Committee, has kindly sent us the following account of exhibitions and fairs in Bihar :—‘ In Bihar there are several ancient fairs, some of which give great stimulus to Indian industries. The chief of these fairs is the Sonpir Fair held every year on and about the Full Moon day of Kartic. No attempt is, however, made to offer prizes and medals to the exhibitors of the best industries nor are the industries catalogued in any year. The other important fairs, such as those held at Megh Mordah (Purnea), Bihta (Patna) and Kat Bahrapur (Arrah) are essentially Cattle Fairs. But with some effort they may be converted partly into exhibitions of agricultural and general industries. The Bihar Industrial and Agricultural Exhibition was held in February 1907, at Bankipur. The chief exhibits were cotton, mixed and silk fabrics of Bihar, Fatwa of Dinapur, of Patna, of Bhagalpur, Gaya and Arrah, glass-made articles of Patna, steel trunks of Patna, iron ware from Dinapur and the Bihar School of Engineering, potteries of Sewan and Sasseram, painting from Arrah,

carpenters' work from Dinapur, the famous Kokti cloth from Durbhanga, basket ware and sirki work, carpets both cotton and woollen, Kevor, chiefly from jails, aloe fibre and plantain fibre, cutlery and other articles. The exhibits all came from Bihar.

MADRAS.

22. The failure of Arbuthnot & Co. and the misery into which many families were plunged thereby gave an impetus to the organisation of capital by Indian agency, and the Indian Bank, Ltd., Madras, was the result. Its authorised capital is Rs. 20 lakhs. Business was commenced in the middle of the year. Other joint stock banks started during the year are the Agricultural and Commercial Bank, Tinnevely, capital Rs. 2 lakhs ; the Trichinopoly National Bank, capital Rs. 1 lakh ; the Worriar Alliance Bank, Trichinopoly, capital Rs. 1,49,985. There was besides, the Madras Central Urban Bank, registered under the Co-operative Credit Societies Act. Its main object is to collect funds for financing Co-operative Credit Societies established in the mofussil. The capital of the bank is Rs. 25,000, made up of 50 shares of Rs. 500 each. Four-fifths of the members shall always be non-agriculturists. Every member joining the bank must take at least one share, but no member can at any time hold more than five shares. No member shall be permitted to transfer any share held by him, unless he had held such share for a period of at least one year.

23. Reference was made in last year's Report to the Conjeevaram Weavers' Urban Union. Dewan Bahadur P. Rajagopalachariar, who was till lately Registrar of Co-operative Credit Societies in Madras, some months ago sent an interesting report to the Government of Madras comparing its working with that of the Benares Silk Weavers' Co-operative Association, the principal features of which were also pointed out in last year's Report. The societies are 'essentially of a similar nature,' but they 'differ considerably' in organization. Mr. Rajagopalachariar writes to the following effect :—

'While the Benares Association is registered on the basis of

limited liability with a paid up share capital, the Conjeeveram Union is registered on the basis of unlimited liability, and has no paid-up share capital. Both Societies purchase their raw material wholesale, and then retail them to their constituents at prices more favourable than those given them by middlemen generally. The Societies then receive the finished products from the weavers and sell them to the best advantage. The question of distributing the finished product, however, is not so easy as that of production. The difficulty of getting rid of the finished product is not so great at Conjeeveram as it is at Benares, as the Conjeeveram Society turns out articles of cotton, and on such a small scale as to meet a steady local demand for them ; whereas the high-priced silk goods turned out at Benares have to go considerable distance to find a market.'

24. Handloom weaving has received considerable attention. The Hanuman Weaving Factory was started at Madras by Messrs. S. Ranganatham Chetty & Co. It turns out handkerchiefs and *dhotis* with silk borders. The Kistna Textile Manufacturing Co., Ltd., was started at Narsapur in the Kistna district with a capital of Rs 1 lakh divided into 1,000 shares of Rs. 100 each. The object of the Company is to develop the industry of cotton weaving. It was working at first with handlooms of different sorts, indigenous as well as English, but it has since received some powerlooms and an engine and a boiler to work them.

'To give a successful start to beginners a machine on the model of the English sizing one with cylinders and size-box has been constructed by P. Moorthy Chetty, head jobber of the said company, and it is working satisfactorily. It could give warps also for double powerlooms. The yarn is at first put in the sizing, then rolled on a big drum and afterwards worked on the warping machine of 500 bobbins and finally these four or five warps beams of small breadth are put on the newly constructed sizing machine and are formed into one warp of the required breadth.'

A weaving factory was started at Puthur in the neighbourhood of Negapatam. A *Komati* merchant of Sidhout introduced fly-shuttle looms and is carrying on good business. Two men were sent from Hospet to Calcutta at the public expense to learn weaving on improved handlooms. A number of young men trained at the Government Weaving Factory, Salem, started a private factory with fly-shuttle looms

at the same town. The Nidadavole Weaving Factory in the Godavari district and the Rajam Spinning and Weaving Co., Ltd., in the Vizagapatam district are doing good business. Ellore in the Kistna district is a place noted for carpet-making. The industry is on the decline, however. It is right, therefore, that the Oriental Carpet Manufacturing Co. has been established there. It is working with eight big looms and 52 workmen under the management of an expert of 40 years' experience. The Company has also employed a special designer. Other concerns started during the period under review are the Guntur Hosiery Mills Co., Ltd., Guntur, capital Rs. 50,000 ; the Kaliswarar Mills Co., Coimbatore, capital Rs. 9 lakhs ; the Kamakshi Mills Co., Tanjore, capital Rs. 10 lakhs, and the Sri Todpura Sundari Cotton Press, Bezwada, capital Rs. 85,000.

25. The Vizagapatam Sugar Development Co., Ltd., has just been formed at Anakapalle in the Vizagapatam district with a capital of Rs. 3 lakhs divided into 6,000 shares of Rs. 50 each with the object of erecting 'the First Model Sugar Factory which will be in the nature of a Sugar School in the centre of an extensive sugarcane cultivation. The factory will be managed by Mr. A. E. Jordan, Sugar Expert. The Negapatam Swadeshi Steel Trunk Manufacturing Co. manufactures steel trunks, patent steel brief bags and dispatch boxes of high class quality. A Glass Factory was lately started at Ennur, Madras, under the management of Mr. S. M. Shafi. Sodawater bottles are made at the factory. Mr. S. Ramarao returned from Japan after learning glass manufacture and has been trying to start a glass factory. He has secured a friend who offers Rs. 2,000 as his share and efforts are being made to get a few more persons who will join and form themselves into a limited liability company. The sand of Tiruvottiyur, which has been certified to be suitable for the purpose, will be used for making glass. The Vizagapatam Mills Co., was formed at Vizagapatam with a capital of Rs. 5 lakhs with the object of milling rice. The Sri Laxmi Rice Mills Co. was formed at Gun-

tur with the same object with a capital of Rs. 20,000 ; and the Anakapalle Commercial Syndicate with a capital of Rs. 50,000 has the same object, too. The Cocanada Jute Press Co. was formed at Cocanada with a capital of Rs. 1,50,000. The South Indian Agricultural and Industrial Improvement Co. was formed at Anakapalle with a capital of Rs. 1 lakh. The Coimbatore Industries, Coimbatore, with a capital of Rs. 20,000, will have a chrome tannery. The Kistna Chemical Works was started at Siddhantam in the Kistna district, where also there is the Godavari Soap and Candle Factory. At Pithapur in the Godavari district two factories came into existence for making soaps and candles. It is said that the Rajah of the same place is thinking of starting a Mill for Spinning and Weaving Cotton. The Swadeshi Steam Navigation Co. which was formed last year, is progressing and increasing in popularity.

26. Stores for selling indigenous goods have increased in number since last year. Prominent among these may be mentioned the Triplicane Co-operative Society which has started a distributive Co-operative Stores 'on the historic model set by the Rochdale Pioneers.' The number of members of the society at the end of June was 637, and the share capital amounted to about Rs. 4,950. A branch of the society was opened at Egmore in February. The total distribution of goods to members in the nine months ending June last amounted to Rs. 1,20,530, or an average of nearly Rs. 13,400 a month for all the branches. The Cuddalore Swadeshi Mercantile Co., Ltd., opened an emporium for indigenous goods. It has a capital of Rs. 20,000. Under the name of the Aryan Stores a business was started at Trichinopoly as a limited liability company, the nominal value being Rs. 6,000. 'Deposits are received and $7\frac{1}{2}$ per cent. interest is guaranteed, in addition to bonus at the discretion of the proprietors. The object of the institution is to encourage Indian articles of all kinds.' Two Swadeshi shops were opened at Hospet, one to sell cloths and the other stationery and other articles. The

promoters take moderate profits, reserving the balance of profits to the promotion of industries. The Tanjore National Co-operative Emporium has a capital of Rs. 20,000. The Narasapur Industrial Improvements Co., capital Rs. 50,000, has for its primary object the sale of country-made goods. Similar is the case with the Kallidaikurichi Sudesa Tolil Pandasali of Tinnevely, capital Rs. 20,000, and with the Saidapet Industrial Co., Chingleput, capital Rs. 10,000.

It was remarked in last year's Report that almost all these shops are on a comparatively small scale. There are no stores in the presidency which will bear comparison with the Bombay Swadeshi Co-operative Stores Co., Ltd., or the Indian Stores of Calcutta. The attention of the Second South Indian Industrial Conference which met at Vizagapatam was called to the matter, and it passed the following Resolution on it :—

‘That this Conference notes with satisfaction the increasing number of shops for storing and selling articles of Indian manufacture which are being started in different parts of Southern India, but regrets that many of them are too small to meet the growing demand for such articles. In the interest of the Swadeshi movement, this Conference earnestly urges educated Indians in every district to organize on a large scale Swadeshi stores on a Co-operative basis.’

27. Several Industrial and Agricultural Exhibitions were held during the year in a few districts. The South Indian Industrial Exhibition of Vizagapatam has been referred to. There were besides, the Narasapur Agricultural and Industrial Exhibition and the Cannanore Agricultural and Industrial Exhibition. The Northern Circars Swadeshi Show will be held at Siddhantam in the Kistna district in January next.

28. The National Fund and Industrial Association of Madras has been doing useful work. To popularise the fly-shuttle looms among the weavers who have evinced a desire to work them, the Association has put six fly-shuttle looms and employed a weaving instructor for the Conjeeveram Urban Weavers' Union. Two students were sent to apan to receive practical training in making candles, soaps,

pencils, cement and matches. Arrangements have been made to open a class in Madras to train students in soap and wax-making. Attempts are being made towards the formation of a library of industrial and technical subjects, and the nucleus of a library has already been formed. We have already referred to the generous offer of the Hon'ble Mr. V. Krishnaswamy Iyer to start a weaving school at Madras. Another prominent member of the Association, the Hon'ble Mr. P. S. Sivaswamy Iyer, has been paying Rs. 50 a month to enable it to send a student to a foreign country for technical education. The funds of the Association amount to nearly Rs. 10,000.

THE UNITED PROVINCES.

29. The Imperial Bank, Ltd., was started at Meerut with branches at Aligarh and Moradabad with a capital of Rs. 2 lakhs divided into 4,000 shares of Rs. 50 each. The Superior Bank, Muzaffarnagar, was started with a capital of Rs. 20,000. The Co-operative Banking and Trading Society, Ltd., Benares, combines, as its name implies, banking and trading, the latter being limited to Indian goods. The aims and principles of this Society are best explained in the words of the prospectus from which we quote below :—

‘The success which has attended the working of Co-operative Credit Societies in other districts has led a number of leading gentlemen in Benares to interest themselves in establishing a Co-operative Banking and Trading concern in Benares. The need of an institution whence loans may be obtained by the ordinary classes of the people at moderate rates of interest, and of a shop for the sale of genuine goods at fixed prices had long been left here. Institutions started on true co-operative principles thrive and abound in European countries, and it will be the aim of the projected society to work on the same lines and to help local trade by providing cheap capital, and placing a well-furnished store of indigenous goods and useful and necessary articles not made in India at the disposal of the Benares public.

‘The Society will be registered under the Co-operative Credit Societies Act, No. X. of 1904, and its capital will be raised by the issue of shares tenable by persons residing or carrying on business in Benares. In order that a large number of men of all ranks may join by purchasing shares and thereby avail themselves of the

advantages offered by the Society, the price of each share has been placed at Rs. 5 only, and no person will be allowed more than 200 shares of the value of Rs. 1,000. The total capital at present proposed to be raised in this manner is Rs. 25,000.

'The affairs of the Society will be managed by a Board of Directors elected by the shareholders. Loans will be made only to shareholders of the Society, or to independent Co-operative Credit Societies. No person unconnected with a Co-operative Credit Society will be entitled to deal with this Society. Those who desire to benefit by such dealings should, therefore, at once apply for shares. The Society will work in a field all its own, and will not place itself in opposition to any existing private firm in Benares.'

If the United Provinces are fortunate in having a Lieutenant-Governor, who is in full sympathy with the Industrial Movement, Benares is doubly blessed in having a Collector and District Magistrate so full of genuine Swadeshi spirit as Mr. E. H. Radice, I. C. S. Mr. Radice presided over the meeting at which this Society was formed, and he is also President of the Swadeshi Vastu Pracharini Sabha of Benares ; the only instance, we believe, in all India of a District Officer placing himself at the head of such an organisation.

The Unao Town Bank was established in November 1906 for the purpose of financing its members and rural Co-operative Credit Societies. It showed very favourable results for the period ending June 30th, 1907. A dividend of 10 per cent. per annum was declared out of the net profits, after laying by some amount to form a reserve fund. The assets of the Bank were Rs. 97,700-2-4, and the total receipts for the period under notice amounted to Rs. 1,69,438-3-9.

30. Among the concerns started during the period under review are the following :—the Bahralla Cotton Ginning Press Co., Barhalla, for manufacturing cotton, wool, etc., capital Rs. 1 lakh ; the Jumna Flour Mills Co., Cawnpore for the manufacture of flour, capital Rs. 3 lakhs ; the Union Indian Sugar Mills Co., Cawnpore, capital Rs. 4 lakhs ; the Hitkarni Co., Agra, for general trading, capital Rs. 20,000 ; the Harisankar Busdeo Cotton Press and Ginning Mill Co., Debai, for manufacturing jute, cotton, etc., capital Rs. 96,000 ;

the Agra Boot and Equipment Factory for tanning and manufacturing leather, capital Rs. 5 lakhs ; the Hadi Sugar Manufacture Works, Meerut, capital, Rs. 1 lakh ; the Ganges Sugar Works, Cawnpore, capital Rs. 5 lakhs ; the Friends' Trading Co., Gorakhpur, capital Rs. 20,000 ; the Trading Vaisya Ginning and Cotton Press Mills Co., Agra, capital Rs. 1 lakh ; the Bharat Bhandar, Mirzapur, for encouraging and extending the production and consumption of Indian articles, capital Rs. 25,000.

31. Messrs. Varma Brothers of Aligarh started business in making felt caps which are undoubtedly superior to any of the kind yet made in India. The proprietor and founder of the business is Mr. Mohan Lal, Barrister-at-Law, who utilised his spare time in England while studying for the Bar in learning this important industry at first hand for future introduction in his own country. The Glass Industry Promoters' Association, Dehra Dun, is formed for utilising the knowledge in glass manufacture which was acquired by Babu Saligram Sinha of Benares during a three years' stay in Japan.

32. There is a Weaving School at Bara Banki opened by Mr. Sherring. Candidates are admitted on condition that they each purchase one loom or machine and pay a monthly fee of Re. 1 for the Salvation Army Loom class, Rs. 2 each for the Benares Loom and the Knitting Machine classes. The average period taken by a student on each machine is as follows :—

No.	Name of Machine.	Class of Student.	Time taken.
1.	Salvation Army Loom	{ Artisan ..	2 months
		{ Non-artisan ...	3 „
2.	Knitting Machine ...	Non-artisan ...	3 „
3.	Banares Loom ...	{ Artisan ...	6 „
		{ Non-artisan ...	12 „

The daily output in the case of a weaver when he has learnt his work averages from 8 to 12½ yards according to the count of yarn used.

33. We have referred in a foregoing paragraph to the Swadeshi Vastu Pracharini Sabha of Benares of which Mr. Radice, District Magistrate, is himself the President. The aims and objects of the Sabha are (1) to endeavour to produce and prepare the best arts of the world in India ; (2) to perfect, improve and sell indigenous articles in the country and abroad ; (3) to foster the vernacular languages and Indian industry ; (4) to discourage all such things as are harmful to the cause of Indian progress and to work with the principle of real self-help ; (5) to gather materials for completing the objects in view. A very useful adjunct to the Sabha is to be a factory to train and bring different kinds of artisans and handicrafts. There are also to be opened workshops to give protection to the orphans, to foster the growth of the indigenous arts and to encourage vernacular education.

THE PUNJAB.

34. The following new banks have been started in the Punjab during the year :—the Lyallpur Bank, Lyallpur, capital Rs. 1 lakh ; the Industrial Bank of India, Ludhiana, capital Rs. 5 lakhs ; the Bank of Multan, capital Rs. 2 lakhs ; the Orient Bank of India, Lahore, capital Rs. 5 lakhs ; besides a branch of the People's Bank of Lahore opened at Delhi.

35. Other new concerns are the National Insurance and Banking Co. of Amritsar, with a capital of Rs. 10 lakhs ; Messrs. J. Roy & Co., Multan, capital Rs. 2 lakhs, business general trading ; the Punjab Commercial House, Amritsar, capital Rs. 1 lakh, business general trading ; the Century Flour Mills, Lahore, capital Rs. 5 lakhs, business milling flour ; the Bhagwati Flour and General Mills Co., Ltd., Ambala, capital Rs. 15,000, business wheat and grain milling ; the Swadeshi Weaving Co., Amritsar, capital Rs. 50,000 ; the Indian Stores and Manufacturing Co., Delhi,

capital Rs. 1 lakh, object the promotion of the sale of indige-
nous goods.

36. At the Vaish Conference held at Ambala in February, Rs. 50,000 were subscribed for the Foreign Education Fund of the community. It is said to be the intention of the members of the Conference to allow this fund to accumulate till it reaches Rs. 5 lakhs. And then it will be devoted principally to enable the young men of the Vaishya community to acquire scientific and industrial education in foreign countries. A Swadeshi Exhibition and Bazaar was held along with the Conference, and it was a great success.

THE CENTRAL PROVINCES AND BERAR.

37. The only two concerns to report are the Karanja Chemical Works Company, Karanja, Berar, started to manufacture scents, oils, etc., under the supervision and guidance of Mr. N. P. Sampat of Messrs. Sampat Brothers; and Messrs. Jogalekar and Co., Akola, capital Rs. 1 lakh, for manufacturing and dealing in Swadeshi articles. As mentioned in last year's Report, weaving sheds have been added to the Akola Native Cotton Ginning, Pressing, Spinning and Weaving Company and to the Akola Oil and Ginning Company.

INDIAN STATES.

38. *Mysore*.—Mr. Vinayak Ganesh Joshi of Poona obtained certain concessions from the Mysore Government such as free timber and free land for opening a match factory in Mysore. The Karnatak Weaving Establishment was started at Bangalore with a capital of Rs. 50,000 for weaving with improved handlooms. The Mysore Fruit Syndicate was started with a capital of Rs. 3 lakhs for fruit cultivation. The Mysore Raj Tobacco Manufacturing Company was started at Bangalore with a capital of Rs. 15,000 for curing and flavouring tobacco and manufacturing cigarettes. The Mysore Chromium Company was started with a capital of

Rs. 3½ lakhs for mining chromite. The directors are Messrs. Hamilton Holmes, James Short and T. B. K. Gandachar.

39. *Baroda*.—A new Cotton Spinning Mill was started at Baroda by Mr. Chimanlal Samal Bechar and others early in the year and His Highness the Gaekwar formally opened it. The Gaekwar Umbrella Factory was started by Mr. Luhar with a capital of Rs. 50,000, divided into 500 shares of Rs. 100 each. It was proposed in this factory to manufacture all the parts of iron, brass and wood, etc., and even the water-proof cloth. The machinery would also prove useful for manufacturing wheels, pinions and other parts of clocks, musical instruments, etc. Another concern started in Baroda is the Shrimant Rajkauza Handloom Weaving and General Trading Co., Ltd., with a capital of Rs. 1,25,000 divided into shares of Rs. 50 each.

40. *Ajmer*.—Two companies were started at Ajmer—the General Assurance Society with a capital of Rs. 1 lakh, and the Pursharthi Co. for trading with a capital of Rs. 20,000.

41. *Cochin*.—The Swadeshi Co-operative Stores, Ltd., Cochin, with a capital of Rs. 20,000 divided into 4,000 shares of Rs. 5 each, was started with the object of storing and selling Indian goods.

42. *Kawardha*.—The Bengal-Nagpur Cotton Mills Co. have established a ginning factory in the Kawardha State in the Central Provinces. This will encourage cotton cultivation which has already gained a firm footing in the state.

APPENDIX I.

MEMORIAL ON INDUSTRIAL SURVEY.

From

THE HON'BLE MR. VITHALDAS D. THACKERSEY,
President, Second Indian Industrial Conference,
and

RAO BAHADUR R. N. MUDHOLKAR,
General Secretary, Indian Industrial Conference.

To

THE SECRETARY TO THE GOVERNMENT OF INDIA,
DEPARTMENT OF COMMERCE AND INDUSTRY,
CALCUTTA.
AMRAOTI, dated December, 1907.

SIR,

We are directed by the Second Indian Industrial Conference, which was held at Calcutta on the 29th and 31st of December '906, to submit a memorial to Government praying for the carrying out of an Industrial Survey in the different Provinces of India, in view of the importance of such a survey for securing a suitable development of indigenous industries and in regard of the recommendation made by the Committee on Industrial Education to that effect. The Governments of the United Provinces and the Central Provinces have, since the passing of that resolution, deputed special officers to make such a survey within their respective territories. But since the other Local Governments have not yet been pleased to take similar action and since it appears that in some influential quarters there is still a doubt felt as to the utility of such a survey, we beg to submit the following observations to Government in the hope that the facts submitted by us may incline those Local Governments which have not yet taken action to reconsider their views and to adopt the course which has been recommended by high authority.

2. The idea of an industrial survey is not a new one. The suggestion was first made by Dr. Forbes Watson so far back as 1872. He was of opinion that "each kind of produce must be accurately described, the different varieties distinguished, the places and methods of production ascertained, the industrial and commercial value investigated, and the question of supply and utilization discussed. And when all this has

been done, provision must be made for rendering such knowledge easily accessible and available for immediate reference not only by Government authorities, but by agriculturists, manufacturers, and men of business generally." The work, according to him, could not be undertaken by any private body but by the Government. "Such a knowledge of the country as is here demanded for India is in Europe the accumulated result of the efforts of many successive generations, the work of legions of pioneers of enterprise who pushing on from experiment to experiment and from failure to failure have revealed to the country by their final success the secret of its resources. The whole of the advanced portion of Europe is in consequence of the development of commerce covered by a net work of private agency, the express purpose of which is to indicate to the consumer the best sources of supply and to offer to the producer the means of realising his products. A similar organization exists, of course, in India also, but only in a rudimentary state and restricted to a few principal towns and to a few of the principal staples, although no doubt it would grow in time by its own efforts. To shorten, however, in India the period of preliminary trials and unavoidable failures, and to hasten the advancement of the country appears to be in the power of the Government which although unable to take the place of private enterprise may promote enquiries which will facilitate the task. Public, as distinguished from private action assumes, therefore, in India much larger proportions than it does here, and this has always been admitted to be the policy of the Government of India. Much has already been accomplished in respect of opening the country by means of information. The trigonometrical, topographical, revenue and geological surveys have been undertaken on a scale of perhaps unprecedented magnitude. It remains to complete the survey which shall take stock of all the various productions of the country, agricultural, forestal, pastoral, and mineral, of manufactures, of the localities of production. of the varieties, qualities and values of the produce, its supply and mode of distribution and consumption."

No action was taken on the suggestion of Dr. Forbes Watson and Sir Louis Mallet, who was at the time Permanent Under Secretary for India, was led to remark: "If there is any one thing which is wanting in any investigation of Indian problems, it is an approach to trustworthy and generally accepted facts. Now I am compelled to say that since I have been connected with the India Office I have found a strong repugnance to the adoption of any adequate measures for the collection of a comprehensive and well digested set of facts. The only occasion on which I had the misfortune of en-

couraging the vehement opposition of some members of the Council was in my advocacy of Dr. Forbes Watson's proposals for an Industrial Survey of India."

3. Sixteen years later the Government of India themselves moved in the matter. In a resolution on Industrial Education and Industrial Survey of India, dated the 18th of June 1888, they said: "But as it is desirable that the step best calculated to promote technical education should form the subject of continuous enquiry and discussion, the Governor-General in Council suggests that Local Governments and administrations should on a convenient, but early opportunity take action in two ways. Impressed with the existing want of information at hand as to the extent, character, and circumstances of important local industries in every province of India, His Excellency in Council would, in the first place, suggest that in each province an industrial survey should be completed." And on the 2nd November of the same year, they addressed all Local Governments "to enquire what action has been taken towards carrying out the suggestion for the completion of an industrial survey." A little later the Government of India addressing the Government of Bengal corrected a misapprehension in regard to the scope of the survey. "In your letter under acknowledgment" wrote the Home Secretary, Mr. A. P. (now the Right Hon. Sir Antony) Mac Donnell, under date the 13th July 1889. "the Government of Bengal appears to propose to limit the enquiry into the industries of Bengal to those industries in which European mechanics and overseers are now employed. The Governor-General in Council thinks it desirable to explain that the Government of India did not contemplate that the industrial survey should be limited in this manner. If the enquiry to be conducted in Bengal is thus restricted, effect will not be given to the intentions of the Government of India, which were to ascertain by local investigation whether any native industries are of sufficient importance and vitality and sufficiently centralised as to be likely to benefit by the establishment of schools of instruction in the theory and better practice of such industries."

4. But no complete industrial survey such as was contemplated by the Government of India was carried out in any province with the exception perhaps, of Lower Burma, as is shown below.

In Bengal an enquiry was in progress as to the reforms possible in the Sibpur College at the time the Government of India's Resolution was issued. The Lieutenant-Governor did not think that the scheme recommended by the Committee appointed to conduct that enquiry was complete,

and desired to make further investigation. "And as such an enquiry would partake of the character of the technical survey proposed by the Government of India," wrote the Secretary to the Government of Bengal. "I am to suggest that the two subjects be dealt with together, an officer being placed on special duty to ascertain what industries in this province offer prospect of remunerative employment to young men educated in the country, and whether students can be properly trained for such employment on the system proposed by the Committee." The Government of Bengal added, "It is not proposed to make any more minute survey, and for the object aimed at a deputation lasting about four months would probably suffice." That the enquiry conducted by Mr. Collin, the officer deputed for the purpose, was far from being comprehensive, becomes evident from the passages quoted below from his report :—

"(a). I have omitted the subject of agriculture and the manufacture of raw products. It would be presumptuous for me in the short period of my deputation to take up this subject. The manufacture of sugar affords a wide field for inquiries, but at this season of the year it would be useless to undertake them. This industry (the cultivation of the silkworm and the manufacture of raw silk), therefore, may be passed over. An industry such as the manufacture of indigo does not fall within the scope of my inquiries. The manufacture of shellac is such a simple process, and has been carried on by both Europeans and Natives for so long that I have omitted it.

"(b) Veterinary science is entirely neglected in Bengal, but a scheme for the establishment of a college has been laid before Government by the Director of the Department of Land Records, and it is not necessary to say anything on the subject. Butter, ghee, cheese-making are industries which also fall within the scope of that Department."

Unduly restricted thus as Mr. Collin's enquiry was, even the industries which were investigated were, we venture to think, superficially treated; and the information contained in the Report is not, in many cases sufficient or accurate enough for practical action being based upon it.

In Bombay nothing whatever was done. And when a few years later the Industrial Conference and the Industrial Association of Western India represented to the Local Government the need of an industrial survey, the reply was given that it was not necessary.

In reply to the Government of India the Government of Madras stated that no industrial survey had been undertaken in that Presidency but that Mr. E. B. Havell, Superintendent

of the School of Arts, Madras, had submitted reports on the condition of *Industrial Art* in fifteen districts of the Presidency, as the results of tours undertaken by him under their orders. "The general result of those reports is," the Government of Madras wrote, "to show that such a survey as this Government understand to be suggested in paragraph 25 of the Resolution of the Government of India above referred to would be infructuous. Should the Government of India, however, consider further action desirable, His Excellency the Governor in Council would be glad to be informed somewhat more precisely what is the nature of the industrial survey contemplated and by what agency it is proposed to be made as it would be impossible for this Government at present to undertake any measures involving additional expenditure." The Government of India wrote in reply "to say that the enquiry which is being made by Mr. Havell into the arts and industries of the Madras Presidency is such an enquiry as was contemplated by the Government of India with the exception that Mr. Havell looks on industries from a more strictly artistic point of view than the Government of India had contemplated and omits to notice the large manufacturing operations which in the Madras Presidency as in other provinces are doubtless carried on in connection with railways, mills or factories. It might be possible to enlarge the scope of Mr. Havell's enquiries in this direction. The Government of India understands that Mr. Havell will compile an account of the industries and arts of Madras after the completion of this inquiry, and that His Excellency the Governor in Council having supplemented Mr. Havell's inquiry in the direction now indicated, so far as may be necessary, will then be in a position to decide* * *." As a matter of fact, neither did Mr. Havell complete his enquiry nor did the Government of Madras supplement it in the direction indicated by the Government of India.

The Government of the United Provinces decided in the year 1890 that no industrial survey of those provinces was needed.

The reply of the Government of the Punjab to the Government of India was as follows:—"Notes on the *Arts Industries* of the Punjab prepared by Mr. Kipling and expanded from those given in the 'Gazetteers' have been published in the Indian Art Journal, and the summary that accompanies that letter was drawn up for the Revenue and Agricultural Department. Monographs on the principal manufactures are also issued periodically from the Financial Commissioner's Office and published for information. With regard to the small degree to which existing industries are centralised, the simple nature of the handicrafts, and the small capital employed, it does not appear that anything

more than this is required at present in the Punjab, and the preparation of a more elaborate survey with statistics would demand, for adequate treatment, a special agency. Nor would such a survey in the Lieutenant-Governor's opinion bring us, in any material degree, nearer to the desired object in this province." It is clear that the Government of India did not regard Mr. Kipling's note on Art Industries as an adequate substitute for an industrial survey, as they wrote in their Resolution of 7th September 1894, that "an industrial survey was not carried out, as existing industries are little developed."

In Lower Burma we understand that an industrial survey was carried out.

In the Central Provinces the enquiry was entrusted to the Inspector-General of Education and the Commissioner of Settlements and Agriculture. Their joint Report, however, it must be frankly stated, was not of a character sufficiently helpful in the manner desired.

In conformity with the instructions of the Commissioner of Berar, "to institute an enquiry each for his own district, and to report upon the extent, character and circumstances of important local industries," the Deputy Commissioners of Amraoti, Akola, Wun, Basim and Buldana sent replies of a few lines each which can hardly be seriously regarded as partaking of the nature of an industrial survey.

The Chief Commissioner and the Director of Land Records and Agriculture of Assam concurred in holding an industrial survey of that province to be unnecessary as "we know already what arts and industries exist and the survey, if undertaken, would teach us little that is new."

The Chief Commissioner of Coorg similarly reported that "nothing would be gained by a further enquiry" after the "very careful investigation" which the industries of Coorg underwent at the hands of "the Local Committee which was appointed to collect exhibits from this province for the Colonial and Indian Exhibition in London in 1886, and over which I presided."

5. Matters rested here till 1902, when the Committee on Industrial Education, composed of Lieutenant-Colonel J. Clibborn, Mr. C. A. Radice, I. C. S., Mr. R. E. Enthoven, I. C. S., and the Rev. F. Westcott, again pointed out the necessity of an industrial survey in paragraph 58 of their Report which is as follows:—"In the absence of a complete survey of Industries, we have found it impossible to make detailed recommendations as to particular industries and the methods of instruction that may with advantage be applied to each. The making of such a survey must necessarily precede the

development of any scheme of Industrial Instruction. A Note on Indian Industries which will, it is hoped, be found useful to officers making a survey will be found at the end of this report. It shows in a striking manner the great importance of some industries which have hitherto received scant attention."

The Note referred to above was prepared by Mr. Radice, and some passages may usefully be quoted from it as showing the need for an industrial survey.

"I. The census taken in 1891 showed that in India more than 30 million persons depended for a living on occupations which may be classed as industrial. This figure indicates the magnitude of the enquiry which must necessarily precede any systematic attempt to improve the skill of the industrial workers."

"II. In accordance with the orders of the Government of India, the Local Governments have caused surveys to be made of various industries, principally those which are related to the textiles, earthen, China and glassware, copper and brass, the precious metals, ivory. The writers of the monographs, which were prepared in each province, dealt with the history of the industry, the castes engaged therein, the centres where it thrives most, the methods of work and implements adopted, the present state and future prospects of the industry, and the wages earned and profits made, by the worker, but no attempt was made to compare the relative influence of each industry on the general wealth of the country. The choice of the textile industries is fully justified by the vast number of workers it supports, but the choice of the ivory industry, which supports less than two thousand persons, can only find justification in the fact that it develops the artistic talent. Other industries such as those which deal with fish, oil, iron, leather, butter, tobacco, sugar which afford a living to very large numbers of workes have not yet been examined.

"III. Turning from the census tables of 1891 to the trade statistics for 1901, the large export of raw material invites attention to those industries which would provide an occupation in working up such materials for foreign markets. The bare statement, for instance, that India exports $5\frac{1}{2}$ crores worth of untanned hides and tanning materials, suggests the importance of giving instruction in processes for tanning hides. Tanning is an industry which thrives on the misfortunes of the agriculturists and which calls for workers to deal with the hides of the dying cattle at a time when the agriculturist finds it most difficult to earn a living.

"Due enquiry would probably suggest many industrial openings in respect of other raw materials which are being

exported in vast quantities. The following may be mentioned—jute (10 crores of rupees) ; short staple cotton ($10\frac{1}{2}$ crores) ; forest lac for varnishes and printer's ink (1 crore) ; coarse wool (126 lakhs).

"IV. The tables for imports are also instructive, but a careful industrial survey may show that much can be done to foster manufactures which will compete successfully with the factories of Europe."

Mr. Radice says of *Drugs* that "examination may indicate a way of greatly increasing exports, and of substituting export of extracts and preparations for that of the raw product." Of *Umbrellas* he says : "Investigation may discover an Indian cane suitable for umbrella handles ; it may be possible to weave the cloth for cotton umbrellas in India. Even the making up of umbrellas from the imported parts would employ many hands." And of iron : "The smelting of the iron ores of India is manifestly a matter of the greatest importance. The question calls for carefully organised investigation. No action, however, was taken on the recommendation of the Committee on Industrial Education.

6. The next occasion on which official attention was bestowed on the subject was, when the Hon'ble Mr. J. P. (now Sir John) Hewett, then Member for Commerce and Industry, spoke of the importance of an industrial survey, with the concurrence as he has since said, of the Government of India, in his speech in the Supreme Legislative Council on the 28th March 1906. He said :—"Much information bearing on this subject (of indigenous industries) has been collected in Census Reports and in Monographs which have been prepared on the different industries ; but the material is scattered, there is no co-ordination of results, the subject is in general treated from the artistic point of view rather than from a business standpoint, and the information is in many cases neither sufficiently detailed nor sufficiently exact to be of much practical use. We hope that other Local Governments * will now make a survey of the state of indigenous industries within the areas of their jurisdiction, with a view to ascertaining the exact state of the various industries and handicrafts, the amount of the earnings and the present condition of the artisans respectively employed in them, the precise manner in which the different industries have been affected

*Mr. Hewett spoke under the impression that the Government of Madras had carried out an industrial survey. This was not so, as what that Government did was to place Mr. Alfred Chatterton on special duty to work up particular industries (for instance, aluminium, handloom weaving, chrome tanning) and not to make an investigation into all industries. A complete industrial survey of the Madras Presidency has yet to be carried out.—V.D.T. & R.N.M.

by competition with imported articles, the practicability of creating new markets, or of developing markets which already exist, and the possibility of giving a new lease of life to these industries either by means of special instruction, or by the improvement of the appliances in use. It is not too much to hope that something tangible may be done to improve their efficiency and increase their scope by reorganising them on modern lines."

7. The Right Hon. the Secretary of State, too, made a sympathetic declaration on the subject towards the end of last year when his attention was called to it by a question in the House of Commons by Mr. H. Nuttall, M.P., President of the Manchester Chamber of Commerce. We quote the question and answer:—"Mr. Nuttall asked the Secretary of State for India whether his attention was drawn to the Report of the Indian Industrial Conference held at Benares last Christmas, and to the plea for an industrial survey on the lines pressed on the Government by Dr. Forbes Watson in 1872, and supported by Sir Louis Mallet; and whether, looking to the fact that the need for such a survey for the industrial development of India was recognised by the Government in 1888, by the Committee on Industrial Education, and by the Member for Commerce and Industry in the Viceregal Council last March, he would cause early steps to be taken so that accurate information as to industrial products and means of production might be made readily available to agriculturists, manufacturers, and men of business generally.

"Mr. Morley: I have seen the paper read before the Indian Industrial Conference, in which the need for an Industrial survey of India was urged. As the Hon. member is aware, the proposal has received the general approval of the Government of India, and the Local Governments have been urged to make a survey of the state of indigenous industries within their territories. I trust that this may result in the collection of much valuable information."

8. The above declarations, however, are, it would seem, not regarded by some Provincial Governments as authoritative and binding and they do not seem to consider that they are under an obligation to give effect to the directions laid down. Excepting the Government of the United Provinces and the Administration of the Central Provinces, the other Governments and Administrations have not yet taken steps to have industrial surveys made of their respective provinces. The Government of Bengal were interpellated on the matter in August of last year by the Hon. Syed (now Mr. Justice) Shurfuiddin at a meeting of the Provincial Legislative Council, and they said in reply that they did not consider an industrial

survey necessary. They seem to have since changed their opinion, judging from the passage quoted below from the speech of the Hon'ble Mr. Gait at the meeting of the Council held on the 6th of April 1907 :—"The first step would possibly be to place some one on special duty to make a general study of the industrial position and possibilities, to collect information regarding the various industries, and to endeavour to ascertain the causes of their rise or decline, and so pave the way for the establishment of the requisite technical schools." While it is gratifying that the Government of Bengal have changed their former opinion that no industrial survey was necessary, it is to be regretted that effect has not yet been given to what Mr. Gait acknowledged was the proper course to follow.

In Eastern Bengal and Assam similarly, nothing has been done. Speaking at a meeting of the Legislative Council of Eastern Bengal and Assam held on the 15th April, His Honour the Lieutenant-Governor, the Hon'ble Mr. (now Sir Lancelot) Hare said :—"In regard to industrial education I can assure the Hon'ble members that there is no subject in which I take greater interest, but let me also say there is none which to my mind bristles with greater difficulties. I should very much like to have in this Government a Department of Commerce and Industry, and I hope that I may yet see such a department established. We have, from time to time, reviewed our industries, and have considered a great variety of opinions as to measures we might take to improve and develop them, but I feel that if we are to deal adequately with this subject we require a whole-time officer at the head of a department possessing special qualifications and experience to obtain and maintain full information as to existing industries and to carefully watch and promote all new efforts and to assist all promising attempts to start new industries with information and advice. As industries show any prospect of development, and as skilled persons are required to carry on these industries, Government might open out suitable training schools. We cannot all be omniscient, and this is a very special branch of knowledge in which the expert is very much in demand. Without such a department as I suggest, I consider that we are likely to be very much in the position of the blind leading the blind. We are likely also, without a thorough and comprehensive review of our position and without a full grasp and understanding of our advantages and disadvantages, to waste our energies over a large field of effort, and so to accomplish less than if we confined ourselves to a few suitable selected industries." We would respectfully submit that the difficulties in the way of making an exhaustive and accurate industrial survey are not at all so

great as His Honour regards them, and we regret that no action has yet been taken in the matter although the importance of an industrial survey is recognised by the Government of Eastern Bengal and Assam.

The Government of Bombay were sought to be moved in the matter by means of an interpellation in the Legislative Council of that Presidency by the Hon'ble Sir Pheroza Shah Mehta. The reply then given was not of a very satisfactory nature. But we understand that since then the subject has been engaging their attention. No action, however, has yet been taken.

The only provinces in which action has been taken or has been decided to be taken are the United Provinces and the Central Provinces.

9. We have endeavoured to give in what has been submitted above, the history of this question as we believe it would serve to remove the misconceptions which prevail in certain quarters. We think it desirable to emphasise the fact that the idea originated with persons whose knowledge and authority is admitted by all and that the Government of India themselves have on more occasions than one declared their acceptance of the view advanced and policy recommended, because we notice with regret that there is still a disposition among some of those on whom depends the institution of an industrial survey to question its necessity, utility or practicability. The need for such a survey is all the greater now on account of the awakening to the absolute necessity of industrial development which is observable in every part of the country. Enthusiasm without knowledge cannot, however, avail much; and at present there is wide-spread ignorance of even the natural resources of the country. And even among the educated and otherwise well informed classes and persons interested in commerce and trade, there is not sufficient knowledge of its industrial capabilities immediate and potential. No real and solid progress is possible unless and until this ignorance is removed and this knowledge supplied. And this is what an industrial survey aims at. For such a survey to yield the maximum benefit it is capable of, it must be complete and thorough; it must extend all over the country, and it "must be so conducted as to regard nothing as beneath notice." It is obvious that the task is of considerable magnitude and beyond the means of any non-official agency that can be employed for the purpose.

In compliance with a resolution passed at the First Indian Industrial Conference held at Benares in December 1905, the General Secretary of the Conference tried to collect information which might supply the place of a rough industrial

survey. A set of questions were framed the answers to which would, it was hoped, give information sufficient to serve as a basis for an accurate and exhaustive enquiry. These questions were sent to over a thousand persons in different parts of the country but the response was most meagre and unsatisfactory—several persons confessing that they had neither the means nor the agency to collect the necessary facts and that the demands of their profession or business left them no time to make the necessary investigation personally. The difficulty is that in thousands of cases private enterprise, unaided by the State, could not get reliable information, no matter what it expended with the object of doing so. It may be left to private individuals to go into the details of industrial projects and to satisfy themselves that the elements of profit are present in them. But as things stand in India, it is the Government which should take upon themselves the task of collecting the data that will enable the manufacturers to direct their activities to those regions in which there is a *prima facie* case for experiment and trial. This sort of assistance was rendered in the case of the Sugar industry by the publication of several articles in the *Indian Trade Journal* last year. What we respectfully urge the Government to do is to institute detailed enquiries in the different provinces, districts and sub-districts on some such line as that adopted in the questions drawn up by the Conference Office. We beg to enclose herewith a few copies of these questions. We believe that working upon the lines indicated, all the facts necessary to be found out about the past history, the present condition and future possibilities of Indian industries can be sufficiently investigated and accumulated.

10. In making an industrial survey we would respectfully suggest that the procedure followed in the Kolhapur State may usefully be adopted in British Provinces. The industrial survey of the State was sanctioned by the Council of Administration which then ruled over the Kolhapur Territory. The scheme was as follows :—

- (1) "To collect information through the village and district agency, about the existing industries in the territory ;
- (2) To visit the principal industrial centres to check the information collected, and to make local enquiries on the spot about the state of the existing industries and the means of improving and developing them ;
- (3) To visit the localities of mineral resources pointed out by the Geological Survey and to see whether any new industries can be started ;

- (4) To visit the principal parts of the forests and to find out if any of the products can be developed and increased so as to turn them to industrial account and to start any forest industries ;
- (5) To visit those parts where no industries exist and to devise means, if possible, to employ some portion of the population there ; and
- (6) Lastly, to condense the information, to describe the state of the existing industries, to suggest means of improving and developing those that already exist, and the possibility of starting new ones. "

Forms and returns with explanatory notes so simple as to be easily intelligible to them, were printed and distributed broadcast to all the villages in the territory through the Mamlatdars and other officers, and the occasion was also utilised to collect information about the indebtedness of the agricultural and industrial classes, by drawing up a set of questions, and distributing them with the other returns. Subsequently, instructions were also issued for making-up the totals for all the villages in a Taluka in a suitable form. With a view to check the information thus supplied by the Kulkarnees, blank forms of the returns were also forwarded through the Deputy Educational Inspector to the schoolmasters. Some of these made independent inquiries and supplied useful information. An officer of the State was placed on special duty to visit the important centres of industrial and commercial activity for checking and supplementing the information collected as aforesaid. He visited large trade centres as well as large weekly markets on market days in order to estimate the consumption of local and foreign industrial products, and to see which of them could be locally manufactured on a larger scale. At important markets arrangements were made for enumerating the number of people that visited the market from outside and for making a rough valuation of the industrial products, cattle and sheep sold. He likewise visited important shops wherever they existed and saw what kind of industrial products were sold, and took care to ascertain the quantities of manufactures that were imported from the neighbouring manufacturing towns on the borders of the territory, and were capable of being locally manufactured. At every industrial centre, the officer visited every industrial house, saw the plant used, the articles turned out, and estimated the cost of the plant and the prices of the raw material required, and of the articles prepared. He marked out such of the workmen as struck him to be possessed of skill and able to do superior work, inquired what difficulties lay in their way and whether they could introduce improvements if assisted. He also tried to point out if a particular

locality possessed special advantages for a particular trade. The result was a report full of instructive information and suggestions.

11. In conclusion we beg to respectfully express the hope that the Government of India will be pleased to favourably consider the suggestions of the Indian Industrial Conference and to again urge upon the Local Governments and Administrations the necessity and importance of instituting and carrying out at an early date industrial surveys within their respective provinces in as thorough, full and accurate a manner as was done in the Kolhapur state.

We have the honour to be,

Sir,

Your most obedient Servants,

VITHALDAS DAMODHER THACKERSEY,

President, Second Indian Industrial Conference.

R. N. MUDHOLKAR,

General Secretary, Indian Industrial Conference.

APPENDIX II.

TECHNICAL EDUCATION IN THE CENTRAL PROVINCES AND BERAR.

The following correspondence was published in the *Central Provinces Gazette* of the 9th November 1907 :—

Dated Matheran, the 21st May 1907.

FROM

Rao Bahadur R. N. MUDHOLKAR, B.A., LL. B.,
*President, Second Central Provinces and Berar Provincial
Industrial Conference.*

TO

THE SECRETARY TO THE HON'BLE THE CHIEF COMMISSIONER,
Central Provinces, Education and Medical Department.

In continuation of my letter dated the 23rd April last and with reference to the Central Provinces Secretariat letter, No. 463—VI.9, dated the 17th idem last, and Mr. Slocock's letter, No. C-384, dated the 3rd June 1906, I have the honour to submit herewith for being laid before the Hon'ble the Chief Commissioner the detailed suggestions which had to be made on the topics included in the first resolution of the Central Provinces and Berar Provincial Industrial Conference held at Jubbulpore on 15th April 1906. I have again to express my regret at the long delay which has taken place in sending these suggestions.

*Detailed suggestions for providing Technical Education in the
Central Provinces and Berar on the lines laid down in
Resolution I passed at the Second Central Provinces
and Berar Provincial Industrial Conference held
at Jubbulpore on the 15th of April 1906.*

Taking into consideration the means and capabilities of the combined territory of the Central Provinces and Berar and the financial resources available, what can be aimed at for the present are :—

- I. Provision of secondary and higher instruction in
(a) mechanical engineering ; (b) cotton and silk

manufacture ; (c) mining ; (d) hardware, (e) industrial chemistry, and (f) agriculture.

II. Crafts schools for (a) carpentry—ordinary and artistic ; (b) smithy ; (c) pottery and chinaware ; (d) brass and bell metal manufacture, and (e) handloom weaving.

III. An institution for experiment and instruction in regard to sericulture as recommended by the Committee on Industrial Education ; and provision for carrying out, though on a smaller scale than that proposed in the Report, their suggestions about testing the comparative efficacy and commercial value of improved methods and appliances in (a) textiles and (b) lac, tans and dyes.

IV. Manual training in High Schools and Anglo-Vernacular Schools ; and drawing in all schools teaching above the fourth Vernacular Standard.

I. For higher instruction there is provision made in the existing schemes for agriculture in the Victoria Technical Institute at Nagpur and for mechanical engineering at the Victoria Technical Institute at Amraoti. Provision also deserves to be made for instruction in the preparation of textile fabrics, mining, industrial chemistry and preparation of hardware. A class for secondary instruction in mining might be joined to the Nagpur Institute and teaching of industrial chemistry, especially with reference to oils, paints and varnishes and to dyeing and tanning, should be arranged to be given there. In the Amraoti Institute instruction in spinning and weaving and in hardware can be arranged to be given.

The cost for providing the educational facilities advocated above in regard to manufacture of textile fabrics and mining will depend upon the scale on which the establishments are organised. Considering the resources of the province the provision should be of the same kind as that settled for instruction in mechanical engineering at the Amraoti Institute. The capital expenditure need not exceed Rs. 15,000 and the recurring expenditure Rs. 6,000 a year for the present. The amounts are calculated so low on the assumption that spinning and weaving classes will under the scheme be joined to the Amraoti Institute, where there will be ready provision afforded of suitable lecturing rooms, and the motive power provided for driving the mechanical workshop can be made to subserve the purposes of the spinning and weaving shed. A teacher like Mr. Fernandez in the Bombay Institute, who for years lectured to the two

lower classes, but who after Mr. Monie's death has been taking the third year class also, can, it is believed, be got at a salary ranging from Rs. 200 to 300 a month. With three jobbers on Rs. 30, 40 and 30 respectively, the staff will be found adequate for our present purposes.

Such an institution cannot be called a first class one, but that is all that we can aim at for years to come. It will be something like a second grade college on a small scale.

For industrial chemistry the facilities already existing and contemplated in the Victoria Institute at Nagpur should be fully utilised. An Assistant Professor, who should be a B.A. and B. Sc. or M.A. in Science and has further received some practical training, should be supplied. The salary will have to be from Rs. 200 to Rs. 350.

In regard to mining there should be two courses—the Upper course and the Lower course. The aim in the Upper course should be to prepare students for the Mining Engineering diploma of the Sibpur Engineering College. The curriculum should be arranged in consultation with the authorities of that College. The course should extend over a year and a half or two. The terms put in in the Central Provinces Provincial Institute should be recognised by that College provided the examination tests are fulfilled; and those who pass should have the privilege of appearing for the Diploma Examination after they put in in the Sibpur College the rest of the period of attendance and instruction prescribed for that examination.

The Lower course should aim at turning out foremen and chargemen. The instruction should be in vernacular.

The instruction in hardware can conveniently go with that in mechanical engineering.

The branches mentioned above have been selected for the reason that the existing conditions of this territory afford special facilities and, therefore make special demands for their development. The resolution of the Conference makes no reference to either hardware or industrial chemistry. These branches are now included because the expected establishment at no distant date of the Tata Iron and Steel Works would afford a far greater scope to the manufacture of hardware than what exists at present and the provision for a well-equipped Laboratory and a Professor of Chemistry at the Nagpur Victoria Technical Institute makes it easy to undertake instruction in industrial chemistry.

II. The Collegiate Institutions mentioned above in section I would supply facilities for turning out mill and factory managers and assistants, mechanical engineers, spinning, weaving and carding masters, industrial chemists,

directors of large agricultural farms, &c. To meet the case of the large number of men who earn livelihood by means of the different handicrafts it is equally necessary that provision should be made for improving these handicraft industries. The work here is twofold : (1) to teach the men who live by these industries the superior appliances and methods adopted in the advanced countries of the West, and (2) to raise their general intelligence and educational qualifications. For this purpose industrial schools based on the model of the craft schools of the West should be established in each district. The circumstances of the different districts vary and the establishment of schools will have to be decided with reference to such circumstances. The following suggestions are put forward tentatively.

NAGPUR DISTRICT.

Hand-loom Weaving.

The hand-loom weaving industry exists on a considerable scale in the Nagpur District. There should be two schools for hand-loom weaving organised—one at Nagpur and the other at Umrer—the two chief centres of this industry in the District. The most improved patterns of hand-looms with the fly-shuttle attachments should be provided, and practical instruction in them should be given in the vernacular by qualified persons with Indian experience. The instruction will have to be in regard to both weaving and the preparatory processes, *i.e.*, warping, sizing, winding, beaming, &c. Concurrently with the instruction in the industry itself there should be instruction in general elementary education and ordinary drawing.

Carpentry and Smithy.

There should be a school for carpentry—ordinary and artistic—and for smithy. Artistic carpentry would include cabinet-making and carving.

It should be convenient to have these schools located near each other and placed under the same board of management. If possible, the funds should be obtained partly from local subscriptions and partly from Government contributions, and the management should be entrusted to a composite body consisting of representatives of the subscribers and the nominees of the Government taken in due proportion. In case popular subscription is not forthcoming the entire money should be found by Government and the Municipal and District Board funds, and the governing body should be organised accordingly. In addition to these special superior carpentry and smithy schools, there should be schools or

classes for teaching ordinary carpentry and smithy in each tahsil.

Provision should be made in this district for instruction in the manufacture of bell metal and brass also.

The suggestions submitted about general elementary education in industrial schools and about carpentry and smithy schools for each tahsil are intended for application to all districts and tahsils.

JUBBULPORE DISTRICT.

In this district the industries that seem to afford scope for development are (1) pottery and porcelain, (2) stone and marble, (3) shellac and (4) sugar. Schools for giving instruction in these industries will be found very useful. In regard to pottery and porcelain it might be considered whether any satisfactory arrangement might not be made with Messrs. Burn & Co., under a system of grant-in-aid based partly on capitation grant and partly on grant by result.

Pottery in Wardha and Yeolmal Districts.

A school for pottery and porcelain should be opened at Warora, and after it is found how it succeeds another might be opened at Wun, in the vicinity of which also the materials required for superior kinds of earthenware are said to abound.

Carpentry schools in other Districts.

Schools for superior kind of carpentry will do well in the following districts—Chanda, Seoni, Hoshangabad, Mandla, and Raipur—as they have large forest areas with abundance of good timber.

Hand-loom weaving in other Districts.

The hand-loom weaving industry exists more or less in every district. It stands next to agriculture in giving employment to and supporting large numbers. While there should be at Nagpur a hand-loom weaving school equipped with every kind of improved looms and with appliances required for the preparatory processes, there should be one weaving school organised on a humbler scale in each district. At Burhanpur in the Khandwa District the work turned out, especially in lace, is in some respects superior to that of Nagpur. There should be at this town a school as well equipped as the one proposed for the latter city. It should further be one in which gold and silver lace work is taught.

The dyeing industry and the paper industry still exist in this town and the carpets called "Jajams" are also turned

out. The first and the last can conveniently be taken in the proposed school for weaving and preparatory processes. The second will require a separate school by itself.

The manufacture of "Jajams" is also carried on in the Betul District and at Wun in the Yeotmal District (in Berar). In the weaving schools of those districts the preparation of these articles should receive special consideration.

At Akot in the Akola District and at Ellichpur (now in the Amraoti District) the manufacture of strong and thick cotton carpets was a paying industry at one time. At both these places schools for carpet weaving as also for weaving should be established.

Bell metal and brass manufacturing schools seem wanted in the following districts:—Damoh, Mandla, Hoshangabad, Bhandara.

At Buldana a considerable number of various kinds of articles of steel and iron, such as scissors, nut-cutters, knives, &c., used to be prepared and they had a good demand. The smithy school there should be such as would enable the disappearing art of these artisans being preserved and imparted to others.

The weaving school for the Buldana District should be located at Deulgaon Raja.

Sericulture and Tassar Silk Weaving.

Bilaspur is the district where a tassar silk weaving school will not only do well, but is in a manner wanted. The Committee on Industrial Education appointed by the Government of India in 1901 recommended the establishment of an institution for experiment and instruction in sericulture at Sambalpur subsidiary to the chief one proposed to be established in Bengal. As Sambalpur is no longer in this province a school like that proposed by the Committee (*vide* Report, pages 22-23) should be established at Bilaspur or Raipur.

Manufacture of Sugar.

In the Betul and the Chhindwara Districts, where sugar-cane plantation exists on a fairly large scale and can be made more profitable than at present if sugar manufacture is established, it would be well if some encouragement for experiments in this direction is given.

Bamboo Work.

Bamboo work should be taught at Chanda, Raipur and Hoshangabad.

Industrial Survey.

The suggestions submitted above are put forward with diffidence as owing to the absence of a properly conducted industrial survey it is extremely difficult to prepare a suitable and comprehensive scheme for technical education. The necessity of such a survey, which was admitted in the Resolution of the Government of India in the Home Department No. 179, dated the 18th June 1888, was emphasised by the Committee presided over by Col. Clibborn (*vide* Report, paragraph 58) and restated authoritatively in the speech delivered in the Supreme Legislative Council on 28th March 1906 by the Hon'ble Mr. J. P. Hewett (now Sir John Hewett), member for Commerce and Industry in the Council of the Governor-General.

Provision for Industrial Experiment.

III. The Committee just referred to point out that before improvements in methods and appliances can be generally introduced, experiment is required :—

- (i) to test the commercial value of discoveries ;
- (ii) to examine the methods and appliances of certain industries with a view to introducing improvements either :—
 - (a) by suitable alterations ;
 - (b) by the introduction of implements and processes used in other countries ;
- (iii) to test the practicability of producing at profitable rates goods now imported into India in large quantities or of working up raw material before export ;
- (iv) to train instructors in the results of the investigations in so far as they lead to the discovery of improved methods and appliances suitable to Indian conditions.

It is not possible to have in this province institutes where work on the lines indicated above can be carried out for all or most of the different industries which exist or can be established here. It is hoped that the utility of an institute for experiment and instruction in sericulture as recommended above will be acknowledged and effect given to the suggestions of the Committee on this matter. But though similar institutes for other industries cannot be provided it is quite feasible to apply in a modified form and on a smaller scale than that contemplated in the Report the very valuable recommendations made therein. For the present action may be confined to two or three departments of industries ;—

- (i) hand-loom weaving ;

- (ii) oils and fats and their preparations for commercial purposes ;
- (iii) lac, tans and dyes.

(i) There is a large number of patterns of handlooms provided with the fly-shuttle attachment each claiming superiority over the rest as being constructed on the most improved plans and being most effective and economical. In the case of some of these there is no doubt that some at least of the merits claimed are well founded. But it is becoming obvious that looms suited for one kind of work or one part of the country are not equally efficient for or in others. In the absence of a recognised body, qualified and prepared to give authoritative advice, persons with small means have been sorely disappointed in their expectations or compelled to earn their experience at a great cost. The difficulties are increasing, as in the ardour for industrial development which has manifested itself recently new types and patterns of hand-looms, are put on the market every day. With a view to minimise these difficulties to some extent and to find out the relative merits of the better patterns of handlooms, a prize competition was instituted in December last by the Indian Industrial Conference for both Cottage and Factory looms. Out of the thirty-two looms brought into the Exhibition ground at Calcutta only ten were entered for competition. The reason why the others failed to do so is obvious. And yet the makers of those looms have been able to sell their productions almost as easily as the tested ones.

It is also necessary to test the feasibility and commercial value of the alterations and improvements which are suggested from time to time. And it is equally, if not more, necessary to have an institution where some special thought would be given to discover methods for improving the efficiency and utility of the handlooms.

While some progress has been made in the matter of handloom itself hardly any advance has been made in regard to saving of time or increase of efficiency of the preparatory processes.

It is suggested that there should be one large Central School of handloom weaving where in addition to teaching workers there should be scope for the kind of experiment and instruction as is laid down in paragraphs 31 and 35 of the Industrial Education Committee's Report. This school should be located preferentially at the place where provision is made for instruction in textile manufacture, with power-driven spindles and looms.

The additional expenditure which the carrying out of this object will involve need not be very great. It is not necessary to have a specialist or an expert of the highest kind and of the most varied knowledge and experience. It is quite feasible to have on a salary of two to three hundred rupees a month a person with sufficient qualifications to answer our requirements as set out above.

(ii) and (iii). The oil industry of the province is growing and the preparation and refinement of cotton seed oil, rossa oil, &c., the improvement in the processes employed in expressing oil from linseed, sesamum, gingelly, rapeseed, &c., and the manufacture of paint, varnishes, soaps, candles, &c., are matters which demand urgent consideration. In the Nagpur Institute provision should be made for conducting experiments for testing the commercial value of the industries dealing with these products in the manner in which the Government of Madras made experiments in regard to aluminium under the direction of Mr. Chatterton or are now doing in regard to chrome tanning. Similar action is also very desirable in regard to lac, tans and dyes. If our provincial institution at Nagpur works in co-operation with that of Madras, as it should, there would be great saving of time, energy and money. With a competent Professor of Chemistry who has studied science not only in its general aspects but with special reference to manufacturing industries and one assistant professor under him, all the demands on the chemical side of the institute in regard to the Agricultural College, the Arts Colleges and the proposed industrial department can be fairly met.

Drawing and Manual Training.

IV. These subjects which form clause (4) of the Resolution I of the Conference do not stand in need of elaboration. Their value as a training of the eye and hand, and as cultivating exactness, precision and lightness of touch, is now universally admitted. Their peculiar importance in India lies in the fact of their counteracting the purely literary tendencies of the race and emphasizing the dignity of natural work. Drawing should be compulsory in the Upper Primary, the Secondary and High School courses and manual training while compulsory for those who take the High School course should also be thrown open to such students in the Upper Primary and Secondary Schools as deserve to avail themselves of the same. The text book of Manual Training for Indian Schools of Professors Alexander and Thomson will answer our purposes.

Scholarships.

On the matters contained in sub-clauses (a) and (b) of clause (5) of the resolution no special suggestion has to be made beyond submitting that the number of scholarships should be sufficiently large. On sub-clause (c) it has to be submitted that the allotment of the State scholarships only to mining will not meet the purposes for which these scholarships have been instituted. The mere existence of abundance of mineral resources in the province is no reason for expecting an admittedly backward province to supply competitors in a branch of technical knowledge which has made very little progress till now anywhere in India. It was only very recently that the mining course was established in the Sibpur Engineering College. It is no wonder that none of the persons who applied for the scholarship last year was found possessed of the special knowledge which is very properly insisted upon as a necessary qualification. It is suggested that the number of State Scholarships for scientific and technical study outside India should be increased to three and that they may be awardable for any one of the following:—(1) Mining; (2) Mechanical engineering; (3) Electrical engineering; (4) Textile manufacture; (5) Sericulture and (6) Industrial chemistry. Pending this increase in scholarships the rigidity of the existing rules should be relaxed to the extent of removing the restriction of the scholarship to mining and throwing it open to persons wishing to complete their education in one of the branches (1), (2), (4) and (6) mentioned above.

No, 1290—VI-9, dated Nagpur, the 14th October 1907.

From—Major T. C. Plowden, I. A. Third Secretary to the Chief Commissioner, Central Provinces.

To—Rao Bahadur R. N. Mudholkar, B. A., LL. B., Advocate of the Central Provinces and Berar, and President, Central Provinces and Berar Provincial Industrial Conference.

I am directed to acknowledge the receipt of your letter, dated the 21st May 1907, in which you make suggestions for the improvement of industrial education and for industrial development in the Central Provinces and Berar.

2. Before discussing your proposals in detail, I am to convey to you an expression of the Chief Commissioner's great appreciation of the interest which you have taken in the matter and of the labour which you have expended in formulating your schemes. While Mr. Craddock is in thorough sympathy with the object which you have in view, he fears that it will be many years before these provinces can have a complete system of technical education without

relying upon the institutions of other provinces. To begin with, the expense would be prohibitive, and in many respects the provinces are not yet sufficiently advanced to justify the establishment of large independent schools for several industries. In the case of large and new industries, which could be carried out only with considerable capital, Government can do nothing direct: such capital must be found by private enterprise. As you will observe from the following paragraphs, which deal with your suggestions in detail, Government already gives indirect assistance by means of scholarships with a view to enabling promising young Indians to qualify themselves for employment as skilled managers and assistants in existing or projected large industrial concerns, such as cotton mills and mineral enterprises.

3. You suggest that a higher course of instruction in textile fabrics be attached to the Amraoti Technical Institute and you estimate the initial cost at Rs. 15,000 and the annual recurring expenditure at Rs. 6,000. Though this would be only a second grade institution the expenditure proposed would be quite inadequate to start anything really useful in the shape of advanced instruction in the preparation of textile fabrics. The scale on which provision is made for the teaching of this subject at the Yorkshire College at Leeds or the Bombay Victoria Jubilee Technical Institute will show that anything on the scale suggested would be of very little use. Moreover, the Chief Commissioner does not consider that the industrial development of the province has yet reached the stage at which the establishment of an expensive college for an advanced course of instruction in textile industries would be warranted. I am to point out that in the meantime Government has taken advantage of the existence of such institutions elsewhere by encouraging provincial students to attend them with the help of scholarships. One student has already been sent to England with a State scholarship to study this subject; and in order to secure qualified scholars for the State technical scholarships in Europe, the Chief Commissioner has decided to give three scholarships tenable at the Victoria Jubilee Technical Institute at Bombay. Mr. Craddock believes that more good will accrue by thus sending students to good institutions outside than by starting an inferior institution within the provinces.

4. You propose that a course of instruction in industrial chemistry in charge of the Professor of Chemistry, helped by an assistant on a salary of Rs. 200—350, should be added to the syllabus of the Nagpur Victoria Technical

Institute. Undoubtedly there is a considerable demand in India, and some in the Central Provinces, for industrial chemists for employment at mines, sugar factories and other works. The addition to the Nagpur Victoria Technical Institute of the course of instruction suggested by you would mean substantial expenditure in additional laboratories and equipment and extra staff ; but the Chief Commissioner is prepared to organize at that Institute post-graduate teaching in mining chemistry and to start a class in industrial chemistry, if managers of existing factories will define the branches of industrial chemistry in which they think they could offer useful and attractive employment to young men so trained. The start would necessarily be on a modest scale.

5. With regard to mining, it is understood that your proposals aim at starting at the Jubbulpore Engineering College (a) a lower course of instruction in the vernacular to train foremen for mines and (b) a higher course in English which would be considered equivalent to the first part of the mining course of the Sibpur College to which students should be admitted to complete their course. Mr. Craddock doubts whether either proposal is feasible. It would be difficult to graft a vernacular course on to the existing college, and the Sibpur College authorities would almost certainly refuse to accept, on the terms proposed, students who had passed half their period of instruction at another institution. You are perhaps not aware that, at the request of this Administration, the Sibpur Engineering College authorities have agreed to admit for the whole mining course such students as are trained up to their entrance standard at the Jubbulpore Engineering School ; and enquiries are in progress as to whether such a standard can be arranged for at the Jubbulpore Engineering College. One student was sent to England with a State scholarship to study mining in 1905, and two more have just gone. The Chief Commissioner proposes to give three or more scholarships, tenable at the Sibpur Engineering College by students who will undertake to be trained as mining engineers. For the present Mr. Craddock does not consider that anything more can be done towards the encouragement of mining education.

6. Before leaving that part of the subject which relates to the facilities offered to young men of advanced education to qualify themselves for well-paid employment in large concerns, I am to say that it is proposed to have some more advanced post-graduate teaching in science at the Victoria Technical Institute at Nagpur, while teaching in mechanics will it is understood, be provided at the Victoria Technical

Institute at Amraoti, as soon as it is completed. The Chief Commissioner does not consider that the Administration would be justified in expanding existing institutions, or raising them at great expense to an equality with more advanced institutions in other provinces, until provincial development has further expanded and the demand for trained men has further increased. The supply in this case must follow the demand, or the advanced and expensive training will only tend to disappointment if those trained cannot find suitable avenues for the practical exercise of the art they have learnt. Such a result would merely cause discontent and defeat the object in view by making technical training unpopular.

7. The second branch of the subject is far more difficult since it relates to a different stratum of society and requires an improvement of handicrafts and cottage industries of which several are in a depressed condition. You propose to open a number of craft schools in certain districts for teaching handicrafts which are peculiar to such districts, particularly where the industry is in a decaying state or has even disappeared. While the Chief Commissioner agrees with you that the object in view should be to revive and improve such industries, he doubts very much whether such handicraft schools as you suggest are the best means for attaining this object. The Indian system under which a son or relative (in most trades even a stranger) is taught his trade by a worker in that trade meets all requirements so far as the teaching of existing methods is concerned. The real requirement for the development of these industries is not a system of teaching *existing* methods but a system of teaching *improved* methods. If an industry is dying out, it will not be revived by teaching the same methods that have failed to keep it alive and flourishing; the causes of decay must be diagnosed, and a treatment prescribed that will eliminate these causes and lead to improvement. In Mr. Craddock's opinion the proper course is to ascertain what industries there are, to select those which seem to be capable of improvement, to find out the methods by which they may be improved, and then to impart those methods to the classes likely to carry on the industries. There are, as may easily be judged, opportunities for failure at every turn and the chances of successful competition with machinery must often be small. The first step should be to collect all the available information on the subject. A fairly large amount has been collected at various times, but much of it is buried away in monographs and special reports, and its extraction, tabulation and classification will be a preliminary step. When this is done it will be necessary to visit and see in working all the industries

which survive ; if they are flourishing they may perhaps admit of some extension ; if they are depressed they may admit of some improvement ; but before any practical step is actually taken the assistance of experts will be necessary. The Chief Commissioner intends to place this work under the direct supervision of the Director of Agriculture and to depute an officer in the ensuing cold weather to make an industrial survey of the province and collect in a handy form as complete information of existing industries as it is possible to obtain. The officer making the survey will require in each district all the assistance that can be given him by gentlemen interested in the development of industries, and it is hoped that the assistance will be real and substantial. He will also receive such help from District Officers as they can reasonably give with due regard to their many duties. If, as is hoped, it is found possible to hold an Industrial Exhibition in Nagpur in November 1908, the officer in question will be able to assist in its organization. By that time much information not now available should be at the disposal of the Administration, which will then be in a position to determine future policy in the matter of the most promising industries. All the information so collected will be submitted to, and discussed by, a specially selected Committee.

8. With regard to your suggestions on the subject of carpentry and smithy work, I am to inform you that for some time past it has been in contemplation to establish an Industrial School in Nagpur as an experiment. The scheme has not been proceeded with because the hope that the public would support it by liberal contributions has not been realized : as you were informed in Mr. Maw's letter No. 367, dated the 26th February 1907, it has not been found possible to enlist any local interest in the scheme. This is partly because the public at large are very busily occupied with their own affairs, and do not feel any special inward calling to devote their money to the improvement of classes who seem to them to be fairly well occupied, and partly because the scheme has been too vague and indefinite to attract interest. But it is also largely due to the fact that the more clamorous sections of the Swadeshi party are more interested in political opposition to the Government, and in the desire to find profitable employment for educated or semi-educated youth, than in the real betterment of the humble weaver or leather worker. They may conceal this even from themselves, but these, and no other, can be the reasons for their refusal to co-operate with the Government in any scheme for the improvement of handicrafts. In these circumstances it is left to the Government to move,

and orders are now issuing for the early construction of the buildings required for the school of handicrafts. The Director of Agriculture (who will informally perform the duties of Director of Industries) has been directed to give effect to the scheme as outlined by Sir Frederic Lely in Mr. Slocock's letter, No. 10291, dated the 5th September 1904, a copy of which was forwarded to you with Mr. Gown's letter, No. 3937, dated the 29th March 1905. The scheme provides for the instruction of boys of the artisan class or any class that like to come forward in smithy, carpentry, wood work, metal work and (as soon as the best form of handloom for local conditions can be determined) in weaving. The institution will comprise a hostel for boys who may come from outside villages, the necessary shed for workshop classes, and quarters for teachers. Later on, when the institution has actually come into being, the Chief Commissioner has no doubt whatever that it will receive much support from those genuinely interested in the subject, and the success which it achieves will be proportionate to the degree of this support. The subsequent management of the institution and the extent to which it can be placed under a Committee containing non-official members must depend on the amount of assistance it receives from the public. If the school is successful it may later on be possible to have similar schools in other districts. At present great difficulty is experienced in securing the services of a suitable staff for even one school, and the estimated expenditure (Rs.12,000 a year) is considerable. One object of the school will be to train suitable craft masters for employment in similar district schools. District industrial schools have been tried in the past and have failed, but with a more carefully prepared foundation and more gradual growth there may be more hope of success.

9. With reference to your remarks on the subject of pottery and porcelain, I am to say that the Chief Commissioner understands that Messrs. Burn and Company will not take Indian apprentices at their Jubbulpore works. The small pottery works at Warora have now been closed. If prospects were good enough private firms would have started long ago to work the clays of Warora and Yeotmal.

10. Mr. Craddock does not consider that a school in sugar manufacture is feasible at present. Although the crop is of comparatively minor importance, the Department of Agriculture is doing its best to investigate both the methods of cultivation and indigenous manufacture. The testing of imported varieties has been started at the Raipur farm, and the improvement of other factors in cultivation is under investigation. Attempts have been made to introduce

improved handmills, and arrangements have been made to determine the loss of efficiency in the indigenous processes ; but until the cultivation of sugarcane is extended and concentrated in compact areas the Chief Commissioner fears that sugar factories are not likely to prove a success. He hopes that some of the large irrigation works under construction or projected will enable this extension and concentration to be effected.

11. The *Tassar* industry has received a great deal of attention. The result of enquiries has been to show that the defect lies rather in the inadequate supply of raw cocoons than in the processes of manufacture. A special investigation was made by the late Mr. N. G. Mukerjee of Bengal, and an Agricultural Assistant is now undergoing a course of training at the Chaibassa (Bengal) Silk Farm with the object of starting a farm in these provinces if it is found feasible. Attempts have been made without success to introduce the Japanese methods of reeling and the latest enquiry tends to prove that these are not so good as the Indian methods. There is nothing new to teach in a school.

12. In conclusion I am to refer you to Chapter XIII of the Central Provinces Education Manual, which contains a list of scholarships available for different branches of technical education in addition to the scholarships mentioned above. As you will have observed from paragraph 3 of this letter, you are mistaken in thinking that the State scholarships to Europe are confined to mining ; under the orders of the Government of India, engineering is the only subject excluded. This Administration has selected mining and the textile industry as the most suitable for these provinces at present, but this does not exclude other subjects if suitable candidates present themselves. As regards the number of scholarships, it is understood that though one only is attached to the Central Provinces and Berar, others could be secured from the Government of India if suitable candidates come forward. The present difficulty is to secure good candidates, a matter in which the assistance of the Provincial Industrial Association will be cordially welcomed.

APPENDIX III.

THE INDUSTRIAL CONFERENCE HANDLOOM COMPETITION.

Preliminary Report.

To

THE GENERAL SECRETARY,

The Indian Industrial Conference, Calcutta.

Sir,

Out of 32 looms exhibited in the Exhibition, 14 looms were found fit to enter for competition as per the conditions of the Conference, of which nine competed for the prizes, six as factory and three as cottage looms. A tabulated statement of the results of our examination has been appended herewith.

The Factory loom of Salvation Army Industries of Anand, Gujarat, and that of Mr. B. K. Ghosh of Chander-nagor have scored 138 and 133 marks respectively out of 200. In the Salvation Army loom taking-up motion requires further improvement and shedding is not automatic. In the other loom, all the motions are automatic and it is a copy of the Japanese handloom, but the working of the loom requires to be made light and easy by using long treadling levers and diminishing the friction in the picking shaft and lever and by providing a seat, at a convenient height, for the weaver to sit and work.

Thus though both the looms have not yet come to the highest standard of efficiency required, yet as an encouragement for further improvement and better work we propose two prizes of Rs. 150 and Rs. 100, respectively, to be given to these looms as 1st and 2nd.

Of the three Cottage Looms, the loom of Messrs. Lascar & Co., scored 134 and Sayaji Poor Man's Loom 124 out of 200 marks.

The price of the loom of Lascar & Co., which is nearly similar to an ordinary Serampore Fly-Shuttle Loom, is Rs. 50, and picking is not automatic, while the price of the other is only Rs. 20 and it has automatic picking, but the parts of the loom require to be made strong. With a view that cheap and effective looms alone can be within the reach of the poor, we after the test was made, came to the conclusion that the maximum price of a cottage loom should

be only Rs. 25 instead of Rs. 50 as was advertised. Judging from this standard, the loom of Lascar & Co., will have to be considered as a factory loom and thus it will get 117 marks. But we cannot do so now contrary to the advertised terms.

Though both the looms have yet to be further improved upon, we propose that two prizes of Rs. 150 and Rs. 100 may be given to Sayaji Poor Man's Loom and Lascar's Loom respectively as first and second among Cottage Looms.

CALCUTTA,
16th January 1907.

} Yours faithfully,
RAOJI BHAI PATEL.
M.A. SAMPATH IYENGAR.
MANMATHA NATH BASAK.
KUNJABEHARI DE.

Full Report.

Report on the Handloom Competition held under the auspices of the Indian Industrial Conference at the Calcutta Exhibition of 1906-07, with remarks on the Handloom Section of the Exhibition.

The harmonious action of the following five principal motions in a loom produces cloth:—

- (1) Shedding (dividing warp threads into layers).
- (2) Picking, or motion of the shuttle.
- (3) Beating up the weft, or motion of the slay for driving in the weft.
- (4) Taking up the cloth woven.
- (5) Letting off the warp.

There is also a sixth necessary motion which does not work, *viz.*, pushing back the slay to make room for the next stroke of the shuttle.

The looms exhibited may be classified with reference to the mechanical contrivances adopted to secure the working of these motions.

CLASS I.—In which all the above movements are actuated by the action of foot-treadles or by a wheel turned by hand, or by the movement of the slay.

The following were the important exhibits under this class:—

- (1) *The loom exhibited by Mr. B. K. Ghose of Chandernagore.*—It is a copy of the Japanese handloom worked by foot-treadles. Its working was satisfactory though the loom was a little too heavy to work. The loom is priced at Rs. 90.

(2) *Shivaji loom exhibited by the Bombay Loom Company.* This is a modification of the Japanese handloom. The weight used to regulate the taking up motion is made to hang down instead of being lifted up and a balance wheel is provided to secure the steady motion of the crank shaft. The loom is priced at Rs. 130.

(3) *The Lame and Blind Automatic Loom.*—This is also a modification of the Japanese handloom ; taking up motion is connected with the motion of the slay and the upper shaft is directly turned by a handle connected with it by level wheels. The frame work was not steady. The price of the loom is Rs. 95.

(4) *Krishnabrindavan's Patent Johar Loom.*—This should be considered a power-loom rather than a handloom. This was the only loom in the Exhibition which showed real originality and good workmanship. All the motions of the loom are secured by the revolution of an ecliptic wheel attached to one shaft. As necessity is the mother of invention, the inventor finding it difficult to get a proper crank shaft for this loom, which was meant to be a copy of the power-loom, hit upon this new method of communicating motion. The inventor of this loom should be encouraged to make a handloom of proper size, as one of that kind is likely to work very smoothly and lightly. If it be properly made it may supersede all the existing costly automatic handlooms in the market.

(5) *The loom exhibited by Mr. B. K. Dhur* was a copy of the power-loom meant to be a handloom, but not useful as such.

(6) *Messrs. Hattersley's Domestic Loom.*—This was found to be capable of giving greater production than any other automatic loom and was found somewhat heavy in working. Our weavers accustomed to lazy working of very light wooden looms may not willingly take to it. The price of the loom is Rs. 180.

CLASS II.—Only shedding being actuated by foot-treadles, the rest of the motions being connected with the motion of the slay worked by both the hands.

The following were the important looms under this class :—

(1) *The loom exhibited by Mr. Osborne Maxwell of the Salvation Army Works, Anand, Gujarat* was the best of this kind. The loom seems to be after Mr. Churchill's loom with the picking and taking up arrangements improved. The loom is well constructed and sound in all its parts. The price of the loom is Rs. 80.

(2) *The factory loom exhibited by the Sayaji Loom Works, Baroda, requires greater stability in some of its parts. It has proper arrangements made for adjusting the levels and heights of slay and yarn beams. The price of the loom is Rs. 50.*

CLASS III.—Shedding and picking being joined and actuated by foot-treadles, and the beating up of the weft and the taking up of the woven cloth being done separately by hand as in ordinary handlooms.

The Simplex Loom of Pali Silpasala was the only one of this kind. The price of the loom is Rs. 35. This is simple in construction.

CLASS IV.—Shedding done by foot-treadles, picking connected with the back motion of the slay which is worked by both the hands. The rest of the movements secured directly by hand as in ordinary handlooms.

A loom of the kind was the Sayaji Poor Man's Loom exhibited by the Sayaji Loom Works, Baroda. In this loom the weaver has to work sitting at a pit having his warp stretched on the floor as in ordinary looms. This is simple and cheap. The price of this loom is Rs. 25.

CLASS V.—Looms with fly-shuttle slay attached.—There were three varieties of this kind.

(1) Fly-shuttle slay adopted to ordinary pit-loom without yarn beam being provided.

(2) In addition to slay, yarn beam also provided to the pit-looms.

(3) Slay adopted to a moveable frame-work containing yarn and cloth beams.

In all these looms the movements are caused independently of one another as in ordinary country looms worked directly by hands and feet.

Frame Fly-shuttle looms exhibited by Messrs. B. K. Ghose of Chandernagor and P. N. De of Chinsura, and Laskar & Co. of Raipur (Birbhum). Pit Fly-shuttle looms provided with yarn beams were exhibited by the local weavers, Babus Kiran Chandra Sen, Hari Chandra Das and three others, and Mr. P. N. De of Chinsura.—These were found the cheapest and most convenient forms of fly-shuttle looms to be adopted by weavers that do their work in their own homes. These looms with slight modifications in forms and sizes are the same as the Madras, Bombay, Madura and Mysore fly-shuttle looms, all of which are copies of English fly-shuttle looms.

Two looms were exhibited, one by the Bengal Silk Mills Company and the other by the Sayaji Loom Works, Baroda.

The former, a foreign one, was in good working order and cloth of six feet was woven in three hours 30 minutes. The latter was an attempt to construct such a loom with as many locally made parts as possible but was not in working order on account of breakages in transit.

Messrs. Hattersley & Sons exhibited a *Tape Weaving Loom* priced at Rs. 250, a *Towel Loom* priced at Rs. 180, and a *Silk Weaving Loom* priced at Rs. 235.

There were also *Benares Looms* for weaving *Kinkabs* with skilfully arranged *Harnesses* for picturesque designs.

The *National Weaving School of Calcutta* exhibited different kinds of looms used in the school, viz., *Hattersley Fly-shuttle Looms*, etc.

Besides the above looms, which were in working order, there were a number of model looms. Some of them were exhibited by students fresh from college and by some Government officials. In these models very ingenious, original mechanical inventions were displayed in crude form. If their school education had offered opportunities for having their hand and eye trained in mechanical work, their ideas would have brought them credit as useful inventions. They were not trained to appreciate form and proportion as the eye had not been exercised in drawing and practical work nor the hand used to the handling of tools and instruments and hence, can do but very crude work.

The Model looms exhibited by Messrs. Bankim Lal Das, Mani Mohan Ghosh and Lalit Mohan Ghosh, Romesh Chandra Dordar and N. M. Mookerji contain original ideas which can be usefully developed with more practical knowledge of the different processes of weaving.

Appliances for Processes preparatory to Weaving.

SPINNING.

There were three exhibits useful for the purpose. One of them from Darjeeling intended for spinning wool, is an ingenious adaptation of the mill spinning spindle for hand work.

The second was from the Weaving Institute of Hole-Narsipur in Mysore State. In this the spindle is turned by a foot-treadle and both the hands are used for spinning. This is used for spinning wool and any kind of fibre and cotton.

The third was a local exhibit, a simplified form of Charak.

Winding Machines:—

(1) A useful bobbin and yarn winder exhibited by the Sayaji Loom Works, Baroda.

(2) There were useful models from the Weaving Institute of Hole-Narsipur, Mysore, and from Mahendralal Banerji of Calcutta.

(3) A bobbin winder with 12 spindles priced at Rs. 152 and a pern winder with 12 spindles priced at Rs. 172 were exhibited by Messrs. Hattersley and Sons.

Warping Mills.—One machine was exhibited by Messrs. Hattersley & Sons. This is suited for making warps more than 100 yards in length but these warps are not useful for sizing after the Indian methods. This serves the same purpose as the old English wooden warping mill used in the Basel Mission Factories. These latter, however, had a greater facility for putting in leases. Hattersley's mill was priced at Rs. 150.

The other warping mill is an original invention exhibited by Sadhu Charan Sarkar, Hari-Narayanpur, Nadia, a poor man not a weaver by caste. This is an improvement upon the native peg warping, and is a real advance from within.

A wheel 4 ft. 9 in. in diameter is divided into three concentric circles and pins arranged round the circumference of these circles receive the yarn as the wheel rotates and preserve the leases formed. The machine, when tested by actual work, was found capable of warping one knob in 30 minutes. The mechanism for turning the wheel is roughly made and does not work smoothly without jerking. This was priced at Rs. 50.

Sizing Machine.—

There was one exhibited by the Sayaji Loom Works, Baroda. This is yet in its experimental stage and is intended for handloom factory works.

The other sizing machine was exhibited by Messrs. Hattersley & Sons and it is intended to saturate the warp with size and to squeeze out the superfluous size, brushing and drying being done on a separate frame. These machines were not exhibited in their working order.

Loom Competition.

The Industrial Conference had announced awards of Rs. 500 to the best Cottage and Factory Handlooms exhibited. A Committee of experts consisting of Rao Bahadur Raoji Bhai Patel, Director of Agriculture and Industries, Baroda, Messrs. Henry H. Ghosh, Bysac, and Kunja Behari De of Calcutta, Mr. B. L. Govilla, Textile Engineer and Chemist, Kurja, United Provinces, and Mr. M. A. Sampath Iyengar, Superintendent, the Weaving Institute, Hole-Narsipur.

Mysore State, was formed. The Committee examined the looms in their capacity and in the construction of their important parts. The looms were kept working for seven hours and the results of their examination have been given below, and a tabulated statement is appended.

For the second time, a loom competition was held on behalf of the Exhibition Committee. In this competition a few local fly-shuttle looms were specially got in to compete for the prize, so that their working capacity might be compared side by side with the new improved looms. In this instance looms were kept working for six hours. The results of this competition also have been given below and a tabulated statement is appended.

The Competition Test:

The looms were tested by the Committee with reference to the following points :—

- (1) Mechanical improvements and construction.
- (2) Adaptability.
- (3) The work done.

Under the head of Mechanical Improvements much importance was attached to the arrangements made to secure the easy and proper working of the shedding, picking and taking up motions, and of the motions of the slay. The looms were also tested to see whether the parts were strong enough to bear the required strain without being unnecessarily bulky. The general workmanship in the manufacture of the machine was also noted.

In regard to adaptability, the Committee took into consideration the following points:—

- (1) Whether the price was within the means of those for whom the machine was intended ?

- (2) Whether the loom was suitable for working with warps prepared according to the country method or necessitated the use of preparatory processes to which our weavers were unaccustomed, or the use of appliances which would be too costly to be possessed by individual weavers ?

- (3) Whether the construction of the loom was simple enough to get damaged parts repaired easily by local artisans ?

The Work done was tested by—

- (1) The highest number of picks per minute attained in fast working for a short time,

(2) The effective number of picks per minute arrived at as follows :—

A. Work was taken for 7 hours 15 minutes, and the total number of picks on the cloth divided by the number of minutes in the whole time.

B. The structure of the cloth produced.

The Results of the Tests.

In the first test the following were found the most successful :—

(1) Salvation Army Loom, Prize Rs. 150.

(2) Mr. B. K. Ghose's Loom of Japanese pattern. Prize Rs. 100.

(3) Laskar & Co.'s Loom (ordinary fly-shuttle loom of the English handloom pattern). Prize Rs. 100.

(4) Sayaji Poor Man's Loom, with automatic picking which is actuated by the back motion of the slays. Prize Rs. 150.

In the second test, the following were the most successful :—

(1) Mr. B. K. Ghose's Japanese Loom.

(2) Sayaji Poor Man's Loom.

(3) Mr. B. K. Ghose's Ordinary Fly-shuttle Loom.

(4) Babu Kiran Chandra Sen's Pit Fly-shuttle Loom.

*General Remarks :—*All the looms were worked by expert weavers with more than ordinary speed and at the end of 7 hours all appeared much tired. In the hurry to turn out as much work as possible the structure of cloth was somewhat neglected. In the second test they were more careful. Fly-shuttle looms in different forms have all equally done good work. Automatic looms on account of their high prices are entirely beyond the means of individual weavers to possess them. To take full advantage of the increased speed of the shuttle in these looms, better processes of winding, warping and sizing than the weavers are accustomed to, will have to be introduced with the help of costly new mechanical appliances.

Now the vital question that has to be decided in the development of the handloom industry in India is whether it is possible to develop it along the lines in which it has so far progressed.

One of the great authorities in cotton weaving, Mr. Richard Marsden, has expressed himself as follows :—

"The skill of Eastern races seems to have spent itself in achieving the most perfect results of which manual processes are capable. The products of Indian, Chinese and Japanese arts, especially in textiles,

in excellence of colouring variety, beauty of design and perfection of execution, are something that the mechanical production of the West is a long way from equalling but to which they may with advantage aspire."

Our weaving industry has developed so far as a cottage industry. If it is to continue as such, our mechanical improvements to increase the efficiency of hand labour must be such as will not compel the weavers to become mere flesh and bone parts of some costly machinery having no idea of how and why the machinery performs its rythmical movement. And our efforts to improve the industry should not become subject to such condemnation as Prince Kropotkin has made: "Skilled artisanship is being swept away as the survival of a past condemned to disappear, for the artist who formerly found æsthetic enjoyment in the work of his hands is substituted the human slave of an iron slave."

Apart from the large portion of weaving work that power mills should do, handlooms have got as much work or even more work to do. Each has its own sphere and although factory work economizes labour, the economic gains to be derived from this domestic industry for a hundred years to come should not be undervalued even in pounds, shillings and pence.

Improvement in the human machinery of the weaver by systematic education and regular work must go hand in hand with the improvement of the appliances for his work. The industry can flourish only under the stimulus of a well organised trade which must be helped by every citizen of India with the responsibility felt and expressed by a prudent economist :

"The trade does not belong to the merchants, capitalists and workpeople of the present generation. But that is a great national property in which they possess only a life-interest. They are bound by every sentiment of affection for their children and love for their country, to pass on to succeeding generations, not only unimpaired but increased in value. To neglect this duty will be to deprive millions of English people in the future of the means of livelihood and the nation of its most important resources. This would be practically criminal."

RAOJI BHAI PATEL,

Director of Agriculture and Industries, Baroda.

M. A. SAMPATH IYENGAR,

Superintendent, Hole-Narsipur Weaving Institute, Mysore.

The Second Indian Industrial Conference Handloom Competition, Calcutta.

FIRST TRIAL.

No.	Kind of Loom.	Name of the Exhibitor.	Time. hrs. m.	Cloth woven. ft. in.	Width of the cloth. in.	Effective picks.	REMARKS.
1	Simple fly-shuttle loom similar to English handloom.	Mr. B. K. Ghose, Chanderdurgore.	7 15	21 11	40½	33·6	Clean edges, break-ages good many, 40's yarn.
2	Automatic handloom resembling Japanese handloom worked by foot power.	Do.	7 30	24 7	40	34·6	Edges clean, structure good, 40's yarn.
3	Sayaji factory loom ...	Sayaji Loom Works, Baroda.	7 30	22 4	42	31·2	Cloth damaged, full of breakages, 40's yarn.
4	Sayaji pit factory loom ...	Do.	7 30	15 7	42	20	
5	Sayaji cottage loom ...	Do.	7 30	17 2½	43	30	
6	Factory loom ...	Mr. Osborne Maxwell of the Salvation Army, Anand, Gujarat.	7 30	25 2	40½	37·3	Structure quite satisfactory, 40's yarn.
7	Ordinary fly-shuttle loom of English handloom pattern.	Laskar & Co., Raipur (Bilbun).	7 30	23 ft.	44	31·9	Structure satisfactory, 40's yarn.

Calcutta Industrial Exhibition Handloom Competition,

SECOND TRIAL.

No.	Kind of Loom.	Name of the Exhibitor.	Time. hrs. mi.	Cloth woven. ft. in.	Width of the cloth. in.	Effective picks.	REMARKS.
1	Simple fly-shuttle loom similar to English handloom.	Mr. B. K. Ghose, Chander-nagore.	6 18	25 8	44	33	Edges not clean, breakages not pieced up satisfactorily, structure fine, 40's yarn.
2	Automatic handloom resembling Japanese handloom to be worked by foot power.	Do.	6 15	28 10	43	41	Clean edges, uniform structure, 40's yarn.
3	Poor man's loom or fly-shuttle slay adopted to ordinary pit loom with automatic picking arrangement.	Sayaji Loom Works, Baroda.	6	25 10	42	48	Edges clean, structure good, 40's yarn.
4	Factory loom picking and take up motion connected with the motion of the slay to be worked by hand shedding by foot treadles.	Do.	5 11	20 1	42	34	Structure somewhat poor.
5	The lame and blind automatic loom worked by hand power.	Mr. Shaik Mahomed Bakur.	6 15	19 8	41	25	Clean edges, uniform structure.
6	Pit fly-shuttle loom ...	Babu Kiran Chandra Sen.	5 51	16 3	46	43	Warp and weft 80's, well finished cloth.

Calcutta Industrial Exhibition Handloom Competition—*contd.*SECOND TRIAL—*contd.*

No.	Kind of Loom.	Name of the Exhibitor.	Time.	Cloth woven.	Width of the cloth.	Effective picks.	Remarks.
7	Pit fly-shuttle loom	... Mr. Goluck Behari Rokhir.	hrs. mi. 6 21	in. ft. 15	in. 45	30	40's warp and 50's weft, clean edges, uniform structure.
8	Hattersley's Domestic loom	... Messrs. Allen Bros.	5 30	63	22	92	Warp and weft. 40's double, very close structure, during the whole period two persons worked alternately, uniform structure, well finished cloth.
9	Pit fly-shuttle loom	... Mr. Harishchandradas.	6	13	44½	30	
10	Pit fly-shuttle loom	... Mr. P. N. De	6	12	41	20	
11	Frame fly-shuttle loom	... Do.	6	12½	41	21	
12	Simple loom	... Do.	3	4 1	42½	15	
13	Jacquard machine	... Bengal Silk Mills Co.	3 30	6			
14	Benares loom for Kinkhab	... Mr. Habibulla	3 30	3½			

APPENDIX IV.

INDUSTRIAL SURVEY QUESTIONS AND ANSWERS.

AMRAOTI, 1st October 1907.

DEAR SIR,

The accompanying circular letter, containing a set of questions framed for the purpose of facilitating the collection of information on the present condition and future possibilities of the industries of each district of British India and the Indian States, was issued by me last year and addressed to nearly a thousand educated countrymen of ours in the various parts of India. The response it elicited was, I am sorry to say, most meagre and disappointing ; only twenty gentlemen having taken the trouble of replying to it. Their replies were published as an appendix to the Annual Report presented on behalf of this office to the last session of the Industrial Conference held at Calcutta. I send herewith a copy of the set of questions aforesaid, with the request that you will take an earnest interest in the subject and collect the needed information. I need not tell you that it is only by the willing co-operation of gentlemen in your position, keenly interested in the material progress of the country, that the Industrial Conference can satisfactorily perform the duties which it has imposed on itself. The first essential of all work is knowledge. But the information at our command on industrial subjects is lamentably inadequate, and must be supplemented by efforts made in each locality by persons like you. These efforts should comprise (1) the bringing together of the information contained in the available official publications, and (2) local inquiries. I earnestly invite you to set yourself to this important task and send to this office as full information as you can possibly put together. I shall thank you to send your reply before the 10th of November to enable me to include it in the Annual Report which will be presented to the next session of the Conference as was done last year.

I remain,

Yours faithfully,

R. N. MUDHOLKAR,
*General Secretary,
Indian Industrial Conference.*

* * * *

QUESTIONS TO BE ANSWERED.

A.—AGRICULTURE.

1. What is the condition of the agricultural industry in your district ?
2. Has the whole or the greater portion of the culturable area been brought under cultivation ?
3. What is the general quality of the soil ?
4. What is the general condition of the land-owning and cultivating classes ?
5. To what extent are the lands held on a proprietary tenure by the cultivators themselves, to what extent by privileged tenants, and to what extent by mere tenants at will ?
6. What steps are being taken in your district for the improvement of agriculture by—
 - (a) Supply of cheap capital ;
 - (b) Extension of scientific and practical instruction ;
 - (c) Employment of improved appliances ;
 - (d) Resort to recuperative processes like manure, etc.
7. To what extent has advantage been taken of the village co-operative credit system, and what amelioration has it effected in the condition of the peasantry ?

B.—MANUFACTURING INDUSTRIES.

8. Name the existing manufacturing industries in the different towns and villages of your district under the following heads :—
 - (1) Textile fabrics—Cotton, Wool, Silk, and Jute.
 - (2) Vegetable and animal products.
 - (3) Leather, horn and paper.
 - (4) Pottery, porcelain and glass.
 - (5) Metals.
 - (6) Chemical industries.
 - (7) Furniture and decorations.
 - (8) Materials used in construction.
9. What is their present condition ?
10. What was their condition in the past ?
11. What is the approximate number of people employed in and dependent on them severally ?
12. What is the approximate amount of capital employed in them severally ?
13. State how far they have been affected by competition with imported articles,

14. What are the Markets for the products of these industries, *i.e.*, do they supply only a local demand, or are they sent to other markets in noticeable quantities ?

15. What facilities exist to increase their supply if an increased demand arose ?

16. How far, in your opinion, are the existing industries capable of expansion, —

(a) by making advances to the artisans at low rates of interest ;

(b) by the improvement of the appliances in use ;

(c) by the imparting of special instruction, and

(d) by the employment of power machinery ?

17. What industries existed in your district formerly but have since decayed ?

18. What are the causes of their decay ?

19. Is it practicable to revive any of them profitably ?

20. If so, suggest measures to bring about their revival.

C.—MINERALS AND OTHER NATURAL PRODUCTS.

21. Name the mineral and other natural products of your district which are or can be manufactured into finished articles of consumption and use.

22. Which of these are manufactured in your district ?

23. Which, if any, of these are sent to other parts of the country for manufacture ?

24. Which of them are exported to foreign countries in their raw state, and re-imported as finished articles ?

D.—CAPITAL.

25. What banking facilities are there for the support of the industries in your district ?

26. Have any urban industrial banks been started in any town of your district under the provisions of the Co-operative Credit Societies Act ?

27. If so, give particulars in regard to their organization the capital employed, the conditions of lending and borrowing, etc.

E.—TECHNICAL EDUCATION.

28. What facilities are there for training young men in the various industries that exist in your district ?

29. If there are any special schools for the purpose, give particulars in regard to their curricula.

30. Is instruction given both in the practice of, and the principles which underlie, an industry, or, is it theoretical merely or merely empirical?

31. What success has attended these schools?

32. Are industrial and commercial classes attached to any of the schools in your district?

33. If so, give full particulars in regard to them.

34. Have any students been sent abroad from your district to acquire technical, industrial or commercial education?

35. What are their qualifications and were they tested?

36. Who, or what agency, has sent them, and under what conditions, if any?

37. In what countries are they being trained?

38. What arrangements are made to utilise their special technical knowledge by the supply of capital or otherwise, to start or develop the industries in which they receive special training?

39. Are there at present in your district any persons who have received special training in any industry? If so, what are the industries in which they have been trained?

40. How are they employed at present?

41. If their knowledge is not being utilised, what steps can be, or are proposed to be taken, to utilize it?

F.—INDUSTRIAL ASSOCIATIONS.

42. Is there any industrial association in your district? If so, give particulars in regard to its objects, rules, funds, past work and present activity?

ANSWERS TO THE ABOVE.

(1) BABARAV JALRAM BHISHE, Esq., *Banswara via Rutlam.*

1. Banswara is a very poor State with an area of 1,946 square miles and a population of 149,128. Its revenue is Rs. 1,50,000 only. It is indebted to the Government of India to the extent of about two lakhs of rupees.

2. I quote below what was written by the Settlement Officer, Mr A. T. Home, I. C. S., in the Settlement Report of 1904-06, on the mineral deposits of the State :—

‘The mineral deposits of Banswara have never yet been properly investigated and it is possible that Manganese ore as in the neighbouring State of Jhabu, or other minerals may some day be discovered. Iron mines were formerly worked at Lovania in the North-West of the State, and tradition is

current that gold was also found there. Stone quarries exist in numerous villages, the best known being at Talwana eight miles west of the capital.'

3. The iron mines of Lovania are not worked for want of knowledge and money. The mine at Khamera is worked by blacksmiths who have their houses there. They were digging *Kachlapathar of Loha* from the iron mines of Udvella, Sadadi, Bamapoda and Yogpura, but from the commencement of this year they have been able to obtain only so much iron as is required for their own work. The reasons for this are given below. The mouth of the Udevella iron mine fell down in last year's rainy season and the poor blacksmiths are not able to open another mouth. They have not also been working the other three mines as more cheap iron than before was imported from Bombay this year. Till this year no or almost little iron had been imported from Bombay, on the other hand iron was being exported from here to the eastern side of Gujarat.

4. About eight miles north from Lovania there are the Parsola iron mines in Udepur State and there are also several iron and copper mines there. In about fifty places in Banswara State you will find iron mines.

5. People say that there was formerly a gold mine, that one Raja filled it up and made a small *mandir* or temple there, Dungree, which is about quarter of a mile south-west of Lovania village, probably has coal.

6. I have seen the Bengal and Warora coal mines, as also the gold mines of Africa. But as I have no scientific knowledge I can say nothing more definite about the mines in these parts.

7. The following information about the places where the mines are situated will be found of use by those who may desire to visit them:—Rutlam is a railway station. Selana is 10 miles from Rutlam and there is a dak bungalow there. Danipipla is 10 miles from Selana. It is a police *thana* of the Banswara State and about 40 *Mahajans* reside there. Eighteen miles from Danipipla is Banswara, the capital of the State. Eighteen miles from Banswara is Lovania, where there are about 80 *Mahajans*. Parsola, in Tahsil Udepure, is 10 miles from Lovania, and 10 miles off it is Jagpura, where there is a police *thana* of Banswara State. Ilhambra is another 10 miles distant, and there also there is a police *thana*. A traveller can see from here the Udvella, Khamera, Sedadi, Bamanpada and Yogpura mines. Banswara is 18 miles from there, and so the visitor may get back to Rutlam.

8. About 20 miles south of Banswara there are also some mines. Two European companies are trying to get con-

cessions for working them, but any Indian entering the field will have a prior claim.

9. It is my belief that in the Banswara and Udepur States there is more mineral wealth than in the Central Provinces where Tata & Sons are going to work.

(2) BABU AMBICA CHARAN MAZUMDAR, *Faridpur*.

1. The condition of the agricultural industry in Faridpur is fairly satisfactory. But the craze for jute growing is gradually absorbing the major portion of culturable areas, excepting the *beel* tracts where paddy cultivation still preponderates.

2. With the exception of the swamps nearly the whole district is under cultivation.

3. The soil is generally alluvial and therefore quite fertile.

4. The landowning classes are generally middle class *Bhadralokes*. Their condition is generally deteriorating; but the actual cultivating classes are comparatively well off and would be better still if they were economical.

5. Tenant proprietorship does not exist here. Three-fourths of the tenants possess the right of occupancy, only a small fraction being tenants at will.

6. There is an yearly Agricultural Exhibition at Faridpur and seeds and other rewards are given to *bona fide* agriculturists. The institution has been in existence for over 30 years; but beyond the cultivation of potatoes I do not think it has helped agriculture very much. The Faridpur District Association has recently taken up the subject and an account of its working can be given only next year.

7. Two Co-operative Credit Societies have been established quite recently. It would be premature to make any forecasts of their working.

8. A sort of fine *Barley* is being manufactured at Dasartha in this district which has been properly tested and found to be very wholesome and of excellent quality. It is sold here and may be also found in Calcutta.

Nibs and knives are also manufactured here. The nibs are largely exported to other districts; but the knives are sold only locally.

17—20. Sugar and weaving industries existed here very largely. The latter has revived under the impetus of the Swadeshi movement; but the former is still decaying, sugar-cane cultivation having fallen off on account of ravages by

wild animals. The sugar industry furnishes an important as well as a difficult problem. It can only be revived by power machinery without which it cannot stand foreign competition.

21-24. Formerly there was pearl fishery in the river Kumar in this District. It has long died out. An effort might be made to ascertain if pearls exist any more in the shells to be found in this river.

Shell lime is obtained from the shells to be found in abundance in this district. A methodical working of this business may prove a very profitable concern.

25. There is no bank particularly to help industries, although the weaving industry receives some help from the Faridpur Loan Office, Ltd.

26. Two Co-operative Credit Societies have been recently started.

28. There is a small technical school established at Faridpur. It at present deals only in carpentry.

34. Some students have been so sent by the Scientific and Industrial Association, Calcutta ; but I cannot give the exact number.

42. The Faridpur District Association recently established proposes to deal with industrial questions also.

(3) RAO BAHADUR D. R. SHRIKHANDE, *Damoh (C. P.)*.

2. Almost all the available land is under cultivation.

3. Half the district is rice-growing and the other half ragi-growing.

4. Tenants are generally poor. Seven per cent. may be doing well. All malguzars are in debt with few exceptions.

6. (b) One experimental farm is opened.

17. Paper-making in Panchamnagar has decayed owing to competition.

19. It is not practicable to revive any of the decayed industries.

The answer to all other questions is *Nil*.

(4) SETH DAMODARDASA K. BATHI, *Beawar (Rajputana)*.

[My answers should be taken as coming out of local enquiries only. But the information about land has been taken from Government officials as no other authentic source could be found. The answers pertain to the town of Beawar only.—D. K. R.]

A.—AGRICULTURE.

(1) The bulk of the population which is rural, is devoted to Agriculture. The industry as a whole is not so paying as to induce people to pay more attention. Several years in the last two decades being those of low rainfall, the condition of agriculture is going from bad to worse. This year also is feared as one of terrible famine and in the near future thousands of men will be found starving.

2. Area has been sown to the normal extent and not much of culturable land remains waste.

3. Generally poor and very inferior to that of Berars, somewhere hilly and somewhere plain. Not rich even in isolated places.

4. Poor and in a very wretched condition but having no aspiration or any ambition to better their state and shy of entering any other field of earning.

5. Approximately $\frac{1}{2}$ by the ex-proprietary tenures and owners, $\frac{1}{3}$ by mortgagees, $\frac{1}{4}$ by tenants at will.

6. (a), (b), (c). *Nil*.

(d) Ordinary manure is only used and near the town mill and factory refuse and blow dust, &c., of mills used for manure. No scientific method is used to improve the land.

7. *Nil*.

B.—MANUFACTURING INDUSTRIES.

8. (1) three cotton ginning, six pressing houses, one cotton mill working with 12,000 spindles and 623 looms.

One cotton mill under construction, handlooms working in the town and a few in villages.

Hand spinning wheels working all throughout the town and many of the bigger villages.

Wool washing and scouring carried in town by hand preliminary to the same being sent to Europe.

Silk weaving was tried in local mill, but on account of very slack demand was abandoned.

No jute industry exists neither is there found any jute here.

(2) Cotton cleaning done by hand extensively in town press houses. Bones collected all throughout for export at the cost of agriculture, which principle the rude villagers would not acknowledge although explained in every way.

(3) (a) Leather washed, and cleared for shoe-making and export. A large trade carried on in raw and partly cured hide and leather.

(b) No horn trade ever existed.

(c) Paper was formerly manufactured but under competition with machine the industry has become extinct.

(4) Pottery work done generally for local use. No porcelain work nor of glass.

(5) Iron, Brass and Bronze (काँसा) work generally done on a good scale in the town. But the industry has declined on account of the keen competition with outside articles and also through these craftsmen getting better livelihood in mills and factories locally as well as at Cawnpur and Ahmedabad, and also in Railway Workshops.

(6) Dyeing done on a good scale. But some dyers joined the mills getting better wages in working the looms. Some emigrated to Ahmedabad on account of bad trade, their customers, the villagers being in bad condition. The town people generally use English dyed and printed goods being decent looking and cheap although less durable.

(7) Nil—except some imitations of ordinary tables, etc.

(8) Slate (stone) and building stone comes in abundance into the town and goes to adjoining places and districts. Ordinary bricks and tiles made for the use of factory buildings only where stone would not do

Almost all wood work required for ordinary dwellings done locally as also metals—excepting screws, hinges, etc., which are now replaced by imported ones on account of their good look although of very little durability.

9. Answered above in reply to query (8).

10. The town is generally prospering owing to the expansion of trade. The town is only about 70 years old. The district was formerly desolate and an abode of robbers and dacoits who would not mind murdering an innocent traveller.

11. (1) Ginning Factories 600 hands in season.

Pressing Factories 500 to 5,000 hands in season.

1 Cotton mill employing 1,500 hands regularly.

1 Cotton mill employing about 300 to 400 hands regularly.

Handlooms employ 300 hands in the town.

Accurate figures for villages unavailable but there may be approximately 200 to 400.

Hand spinning employs 2,000 women in leisure time excepting several months in the year such as Chaitra and Chaturmashya.

Wool washing employs about 200 men in season.

(2) Cotton cleaning included in presses. No figures available for other professions under this head,

(3) (a) About 600 hands.

(4) 200 hands all throughout including villagers.

(5) 500 blacksmith hands. } in town and villages.
50 Brass and Bronze. } Accurate figures not available.

(6) About 500 to 600 hands employed in dyeing and printing according to good or bad time.

(7) About 400 hands employed in carpentry work including villages.

(8) According to demand for stones, slabs and pieces the numbers of hands vary from 50 to 600.

Numbers of men employed in tiles and brick trade vary from Nil to 200.

				Rs.
12.	Cotton Ginning	...	...	1,25,000
	Presses	...	...	4,20,000
	Mill, one working, about	...	...	10,00,000
	Mill under construction will cost about ..			5,00,000

Other figures not available.

13. No definite idea formed about this as practically, before British rule, there was no organization of industries on account of the inhabitants being in a primitive condition. It may be said that dyers and printers are losing ground against imported fabrics.

14. (1) Local and other parts of Rajputana for all hand Industries.

(2) Ports for raw materials.

(3) Bengal, Punjab, Madras, United Provinces and local for mill cloth. Engineers from Europe have come for mill yarns.

15. The unskilled labor being cheap, an increasing demand for it will surely benefit the hand industries. The mills will expand with increased demand.

16. (a) By making advances and improving appliances hand weaving can expand.

(b) Hand dyeing and printing can expand with improvement in appliances, imparting of special instruction and by increased demand.

Machinery is badly need for —

- (1) Printing and dyeing of fabrics ;
- (2) Working wood, and
- (3) Crushing oil which is done on a large scale employing about 300 hands.

17. Paper.

18. Cheapness of machine paper.

19. No.

20. *Nil*.

C.—MINERALS AND OTHER NATURAL PRODUCTS. .

21, 22, 23 and 24. Mica is only explored and exported in raw condition to foreign countries other minerals such as asbestos and graphite, etc., found but remain unexplored. No minerals manufactured.

D.—CAPITAL.

25. Practically none on scientific principles. The people borrow from Hindoo and Mahomedan Sowcars.

26. and 27. None.

E.—EDUCATION.

28. Apprentices were taken for many years up to 1906, and paid for learning weaving, etc., but since they all leave after learning—none are now taken and the weaving in Krishna Mills is now done partly by local and partly by imported labor. In all other industries the people learn merely by practice. Some Engineers have been trained by the Krishna Mills who are now employed in the U. P. and Punjab.

29. *Nil*.

30, 31. *Nil*. 32. *Nil*. 33. *Nil*.

34. No. But two students are apprenticing themselves in the Krishna Mills for Engineership, one of whom gets a scholarship and the other will get one shortly.

35. *Nil*. 36. *Nil*. 37. None. 38. None.

39. Some men have been specially trained at Bombay in dyeing and printing on modern principles and they are prospering.

39, 40 and 41. Some young men are employed in learning the art of managing a Cotton Mill and their services seem to be utilised by the mill in which they work,

Some of the Madras, Sind and Kashmir students returned only last month after receiving training in cotton sizing and weaving. It is not known how their knowledge will be utilised, as the parents of all these are well to do people but not enterprising.

F. INDUSTRIAL ASSOCIATIONS.

42. None.

Remarks.—If capital be forthcoming Beawar can very well maintain a Woollen Mill—also an iron foundry and a wood working concern. Any enterprising gentleman may open a cotton seed oil factory, and soap can also be made. Wool and cotton seeds are great staples in the market and hence this suggestion.

5. P. NATESA IYER, Esq., *Mayavaram* (Tanjore District).

A.—AGRICULTURE.

1. The Agricultural Industry in the District is in a tolerably good condition; and from year to year it is being improved.

2. Almost the whole of the irrigable area has been brought under cultivation; but portions of Pattukottai, Thiruthurai pundi and Tanjore taluks, have to depend upon rain; and in such cases, all have not been brought under cultivation.

3. The general quality of the soil of irrigable area is clay. But rain-fed portions consist of either gravel or sand. On the whole the soil requires yearly manuring.

4. Nearly $\frac{3}{4}$ of the land-owning classes are in embarrassed circumstances. The majority of the cultivating classes are very poor.

5. Except in portions of Pattukottai and Tanjore taluks the lands are the absolute property of the Mirasidars themselves; and the cultivators have no proprietary interest in them; and very small portions are either owned by Zemindars, or Inamdars where the Rent Recovery Act is in force; and in such places, the cultivators have a proprietary interest; and almost all the others are merely tenants at will.

6. (a) No steps are being taken for the supply of cheap capital.

(b) No steps have been taken for extension of scientific instruction. As regards practical instruction, no doubt some steps have been taken in a few centres of the District both by Government officials, and private gentlemen. But practically little work seems to be done; and even the little that is done by Government officials is not made as popular as it should be. But in course of time matters might improve.

(c) It may be said that there is almost no employment of improved appliances. The old method of ploughing is continued. Here and there by lectures and by some respectable Mirasidars taking an interest in the matter, some effort is being made to introduce new and improved appliances.

(d) The old method of manuring the fields by dung and certain kinds of leaves, etc., continues.

7. The Village Co-operative Credit system is not known at all in many villages in the District and the Registrar of Co-operative Credit Societies has not done much in this District.

B. — MANUFACTURING INDUSTRIES.

8. (1) In almost all the Taluks of the District weaving goes on of cloth worn by women as of old. Improved methods have not been introduced except to a very slight extent.

As regards wool, silk and jute, it may be said that nothing of the kind exists at all. No doubt silk is purchased by merchants in these places, and these silks are dyed here and used.

(2) Plantains, jack fruits, mangoes, and such like fruits are available on a large scale. As regards animal products—excepting fish in some of the seaport towns, nothing worth mentioning is produced here.

(3) *Leather.*—As an industry it is *nil*. Raw hides are exported to several places.

Horn.—No manufacture.

Paper.—Do.

(4) *Pottery.* No doubt in almost all places in the District pottery work goes on in a large scale, not by any improved and new methods but in the old manner.

Porcelain and glass Nil.

(5) *Metals.*—Copper, brass, bell-metal utensils of various descriptions are prepared in some of the places, and sent to distant places for sale.

(6) *Chemical Industries*—*Nil*.

(7) *Furniture and decorations.*—As regards this in some places, wooden furnitures, such as chairs, tables, mats, etc., are prepared. But these even cannot be said to be made on any grand scale.

(8) *Materials used in construction* cannot be said to exist on any large scale except what is absolutely necessary for the District.

(9) The present condition is that they have considerably deteriorated. Owing to the introduction of foreign

(by foreign it is not meant outside India—but outside the District) things as a substitute for indigenous ones, and also for want of capital and co-operation the whole thing is going down. Now and then some effort though not of a satisfactory character, is made to revive these industries.

(10) The condition of these industries seems to have been of a very satisfactory character in the past.

(11) In towns the important industries, consist of weaving and metal works. In almost all villages, agriculture is the chief industry and so a very small portion of the population, say 1/10 alone, can be said to depend upon such pursuits.

(12) In weaving, very few have capital of their own. The weavers carry on their profession by borrowing things and repaying in money when possible. But there are few persons who have no doubt some capital to begin their profession, and in course of time, they become either rich or poor according as their business flourishes or not.

(13) Many of the industries have been considerably affected by competition.

For instance Male cloth.—Most people do not go in for Swadeshi cloths because they find machine-made cloths are finer and cheaper.

Female cloth.—Foreign female cloth apparently more fanciful and dead cheap.

Metals.—By the introduction of zinc and aluminium, etc., vessels, native vessels have lost much of their fancy and attraction.

Hides.—Similar is the case.

Oil.— Do. do.

(14) Cloths alone are sent to some distant places in the Presidency. Paddy is sent to some distant places.

(15) No facilities at all exist to increase their supply.

(16) (a) Agriculture is the chief industry. There are also several artisans. By making advances, at low rate of interest, these cannot be much improved, unless new methods are introduced.

(b) By the improvement of appliances, no doubt much can be done. The people are intelligent and capable of turning out good work.

(c) Special instruction is not imparted at all. There are very many schools for general education. People who are willing to learn special branches find it very difficult.

(d) Some time will have to elapse before power machinery is introduced with any advantage, for the people have to be first taught the rudiments.

(17) Formerly lace embroidery, dyeing industries, and weaving, etc., existed but they have decayed.

(18) The causes are the following :—

(1) Desire for Government employment.

(2) Want of organized capital.

(3) Competition of foreign articles.

(4) Emigration of coolies on a large scale.

(19) Weaving can be revived most profitably.

(20) Measures to bring about the revival—

(1) Joint Stock Companies should be formed.

(2) There must be capital enough.

(3) Improved looms, etc., should be introduced.

(21) Nothing. (22) (23) and (24) *nil*.

D.—CAPITAL.

(25) There are no banking facilities at all.

(26) Nothing.

(27) Do.

E.—TECHNICAL EDUCATION.

(28) There are great facilities. People have a natural liking to learn the industries, but no schools where the necessary instruction is given have been opened.

(29) No special schools.

(30) Do.

(31) Do.

(32) Elementary commercial classes have been attached to some of the schools in the District.

(33) Excepting the fact that boys reading in schools for general education, also take up one of these minor technical subjects, nothing worth mentioning has happened.

(34) No. (35) to (41) No.

F. INDUSTRIAL ASSOCIATION.

(42) No industrial association at all.

6. J. R. SUBBAIYA, Esq., *Coimbatore*.

Five or six miles away from this town is a small village called Savaripalayam. It contains only a few houses and the people are all employed in weaving several varieties of checks and shirting cloths. These are generally called Coimbatore checks. They are of the same pattern as those of the checks of the Basel Mission Weaving Company of Calicut. The Coimbatore checks are very cheap and vary in price from 4 as. to 9 as. per yard. But the pity of it is that these weavers are poor and generally live a hand to mouth existence. At the end of every week they sell their products to the local shopkeepers. Thus their goods are not advertised. Considering the durability of these cloths and their cheapness, I am of opinion that if brought to the notice of the public, they will find a ready sale. This is an industry which is well worth encouragement at the hands of all lovers of Swadeshi. There is unfortunately no big shop that deals in these checks of shirting cloths. There is also here a large mill which spins yarns of inferior counts and whose products are sent to several parts of India. In the local Central Jail, weaving is an important industry. Bed covers, dhotis, patties and checks are made.

 7. JOGINDRAVATH SAMADDAR, Esq., *Khulna*, *BENGAL*,
A.—AGRICULTURE.

1. The agricultural industry in this district is in a declining state.

2. Nearly the whole of the cultivable area was brought under cultivation but now some 5 lakhs of *Bighas* are lying waste. Moreover, nearly $\frac{1}{4}$ th of the whole district has become unpaying and it is feared that things will take a worse turn. The following paragraph which I cull from "the Telegraph" (Daily) will substantiate to a certain extent my statements. "We earnestly beg to draw the kind attention of Mr. A. Ahmed, the popular Magistrate and Collector of Khulna, as well as of the Government to a petition praying for the opening of a canal from the river *Altrabanki* through the Village *Gangni* under the jurisdiction of the Police Station *Mollarhat* in Khulna. This proposed canal which would extend to half a mile only will make 30,000 bighas of land fertile by enabling the fresh water of the *Altrabanki* river to water this land, which now remains almost uncultivated owing to the superabundance of saline water that makes cultivation impossible. In these days of scarcity and malaria, if the cutting of a canal of half a mile only would make 30,000 bighas of land fertile, thus providing both food and water to many people, we do not see any objection why Mr. Ahmed who has done and is

doing so much for Khulna, should not take the initiative in recommending to the Government the construction of the canal when as a matter of fact some public-spirited gentlemen are willing to bear all or partial costs for the undertaking." (The *Telegraph* 20th February 1903). The attention of the Government was drawn to it but owing to the opposition of a Zemindar through whose land the canal is to be cut through, the scheme has not progressed at all.

3. Sandy-loam, loam, clay-loam, peaty-loam, and loamy-sand.

4. Precarious excepting big-landowners and tenure-holders who are tolerably well.

5. One tenth of the cultivators' land is held on a proprietary tenure ; three-fourths as privileged tenancy, and the remainder as non-occupancy or tenancy-at-will.

6. (a) Practically no steps are being taken. Very rarely by the Government and not at all by private persons.

(b) Very recently and insufficiently by the Government and by the District Agricultural Association.

(c) Practically *nil*.

(d) Practically *nil*.

7. Through the exertions of Mr. A. Ahmad, C. S., one or two Societies have been started. Babu Jadunath Biswas, Zeminder of Bagghat, tried to start two Societies—one of these has been converted into a Grain Bank, and the other is not in a flourishing condition. The raiyats are too uncultivated and very slow to take advantage of these schemes. The Zemindars and the intelligent section are apathetic and practically very little is being done now-a-days.

B.—MANUFACTURING INDUSTRIES.

8. (1) Only coarse jute which is sent to Calcutta.

(2) No systematic breeding of animals. Among vegetable products *gur* (treacle) may be mentioned.

(3) No sorting of leather generally. The raw skin and horn taken from carcasses left in the open fields and sold to purchasers.

(4) Inferior pottery for household purposes.

(5) Only malleable iron obtained from foreign countries is wrought into several varieties of implements, and tools. A few of these were exhibited at the Khulna Agricultural and Industrial Association held under the auspices of Mr. A. Ahmad C. S., Magistrate and Collector of Khulna, and these were found to be tolerably well made. Gold and silver are utilised for ornaments but the finish is not of a high order.

- (6) *Nil*.
- (8) Bamboos ; wooden materials. Ordinary bricks and tiles.
9. Not improving.
10. Was not in a flourishing conditon.
11. One-fiftieth portion only.
13. Practically none.
14. With the exception of jute which is sent off to Calcutta and *gur* which is exported either to Backergunge or to Calcutta, the products supply a local demand.
16. The existing industries are fully capable of expansion. A technical school has been started—the starting of which was due to Mr. S C. Mukerji, I.C.S., the former Magistrate and Collector of Khulna. An experimental farm has also been started where experiments are being carried on in several branches.

F.—INDUSTRIAL ASSOCIATIONS.

42. *Nil*.

8. RAOJI GOVIND, Esq., *Hoshangabad* (C. P.)

1. The condition of the agricultural industry is not satisfactory.

Some Malguzars and tenants have now begun to raise bunds (embanking of fields). Others, though anxious, cannot do so for want of funds.

Notwithstanding the conciliation courts some tenants have lost their lands owing to indebtedness.

The advantage of conciliation courts was not given to the Malguzars, many of whom are likely to lose their estates on account of heavy indebtedness.

2. The greater portion of the culturable land is brought under cultivation, but the crops (it is feared) will not germinate fully for want of moisture in the soil. In greater portion of the soil cotton seed was sown but owing to the stoppage of rains, some portions of the fields were again ploughed and the rabi crops were sown which for want of moisture, it is apprehended will not fully germinate. Probably Government estimate is 88 per cent. (about the land brought under cultivation).

3. In Harda Tehasil 2 as. out of the whole area is

	मरियार (best soil)
2	ब्रावड
8	मोरन
(particularly in Cherwa tract	4 हाकड (lead soil).
In Seoni Tehasil—like the Harda Tehasil.	
In Sohagpur Tehasil	8 मोरन
	8 राकड

In Hoshangabad Tehasil—almost like Sohagpur. On the whole—one-fourth of the whole area in the district is good and one-fourth is bad, the rest is ordinary.

4. The majority of them are heavily indebted and for want of funds and on account of uncertainty in the fixation of rents and the term of the settlement they do not and cannot make any improvement in their holdings.

5. Proprietary tenures are partly (about half) let out by the plot proprietors and Malguzars to others, for want of seed and sufficient number of bullocks.

The transfer of proprietary rights in *Sir* to creditors has been proceeding rapidly. There has always been a decrease in the area of the *Sir* fields. This is due to their indebtedness and the unsatisfactory character of the season.

6. (a) An urban society was started in Harda last year and four rural banks in other villages of the district. This does not meet the wants and necessities of the agricultural and artisan classes. There is yet time to see their results. The tenants are supplied seeds, &c., by their Malguzars and other creditors and Banias.

(b), (c), (d) A Government model farm was opened at Powarkheda, 3 miles from Hoshangabad where improved appliances are used at a considerable cost, which is beyond the power of ordinary agriculturists to make use of. No practical instruction is given anywhere in the District. A few agriculturists have now begun to make use of cow-dung and other country manures. Some have begun to raise bandhias (embanking) around their fields.

7. It is too early to say anything about it at present. Mostly the tenants borrow seed and other loans from their Malguzars and from Banias.

B.—MANUFACTURING INDUSTRIES

8. (1) There are eleven gin factories, four cotton presses and three hand looms in the District. Jajams, Sutaras (country rough carpets), are prepared in Harda and Sahagpur. Weavers

prepare rough cloth up to 20 counts in many villages of every Tahsil. Rough bangles are prepared in four towns.

2. There are some gardens which produce vegetable and other animal products, sugarcane, &c. No potato cultivation.

3. One leather factory (not by machine) but managed by a European in Harda.

4. One factory of pottery only is started this year like that of Burn & Co., Jubbulpore.

5. In Handia, Hoshangabad and Harda the Kaseras prepare brass pots only.

6. None.

7. One at Rasulia, a mile from Hoshangabad, managed by Missionaries.

8. There are two big markets, one at Tharsi and the other at Rahetgaon, near Harda, for sale of timber brought from jungles in the interior of the district. Ordinary Kumbars prepare in almost all the villages of the district bricks and tiles on old fashion.

9 and 10. Most of the ginning factories will be closed this year for want of sufficient quantity of cotton owing to scanty rains and also for want of sufficient capital to purchase cotton and also due to inefficient and incompetent managers of these factories. When there were only two or three factories and the cotton yield was good and sufficient, they flourished very much and that was the inducement to others to start more such factories, all of which, more or less, receive this year a heavy shock. The pottery work factory is not likely to flourish at present, owing to the tiles, pipes, &c., being inferior to those turned out by Burn & Co., Jubbulpore.

11. On gins about 600 to 700 men are engaged during the working seasons. About 200 men on presses (cotton) and about 2,000 in other industries, such as Kumhars, Kaseras, Weavers, &c.

12. On gins about five lakhs of rupees, on presses (cotton) about two lakhs, on pottery about 20,000; others are worked by individuals with a small capital who scarcely make a decent earning.

13. Brass pots, tiles, bricks and rough cloth are not very much imported in the district except the metal sheets.

14. They supply the demands of the districts only.

15. None for the present,—unless and until the well-to-do class receive technical education and also learn how to combine.

16. By resorting to all the means suggested in (a) to (d) of this question, the industries of the district are bound to flourish.

17. Weaving industry.

18. Foreign competition.

19. Certainly it is practicable to revive many old decayed industries most profitably.

20. If the weavers who now work in the old fashion in many villages of this district are encouraged by supply of capital and by instruction on improved handlooms, they will work wonders. At least one weaving school to impart instruction in improved methods, should be opened here. Some gentlemen here and also in Harda are thinking of raising private subscriptions for this purpose. When one industry like this gets a start and begins to work properly, the other small industries should be taken in hand one by one. Expert supervisors and skilled workmen in each and every branch of the industries are wanting. This want should be met first.

C.—MINERALS AND OTHER NATURAL PRODUCTS.

21. It is understood that there are certain silver mines in Joga of the Harda Tahsil, but they are not yet properly tried.

There are stone quarries in Hoshangabad and morrum quarries in Harda.

There is a kind of grass in the Hoshangabad Tahsil of which paper can be made, but the experiment is not yet tried by any one.

There is a big jungle in the Harda Tahsil in which there is a kind of timber (probably called salai) which can be used for matches if a match factory were started here. There are coal mines in Bagra in the Hoshangabad Tahsil and the work is, I learn, under experiment by a European firm who commenced the work of experiment five or six months ago.

In Rangpur and Chedka of the Sohagpur Tahsil there are coal mines but the work is not undertaken here as yet.

22 and 23. There are two big markets of timber (sag) which is exported to other districts and provinces, particularly Jalgaon and Khandesh.

Flag stones taken out from Hoshangabad quarries are sent to other districts and provinces. Nothing is exported to foreign countries except cotton and grain (including wheat and til seed). Some kacha stones are found and taken out from Bagda hill in the Sohagpur Tahsil. The earth (matti) taken out of these kacha stones is used for pottery work.

D.—CAPITAL.

25. None for the present. There are many rich bankers in the district but they do not understand the advantages of starting such banks for the support of any such industries.

26. Only one urban bank was started in Harda, under the provisions of the Co-operative Credit Societies Act.

27. It was started in 1906. It is managed by the well-to-do and educated Malguzars. Its capital is Rs. 8,000. I had to begin by purchasing 100 shares of Rs. 10 each. Interest charged is 12 as. to 15 as. per cent.

Money is lent to artisans, small shopkeepers and agriculturists on easy terms, and whenever there is no demand the money is lent on hoondies for a very short period. Money is lent on the personal security of two respectable men. Rs. 1,000 have been lent to another rural bank of this district on easy terms and on 8 as. interest.

E.—TECHNICAL EDUCATION.

28. Want of mutual faith and co-operation amongst the people exists and therefore nothing can be done here unless the Government co-operate and give their advice and help. If this is done there are many facilities for training young men.

29. None.

30 to 33. *Nil*.

34. I have sent only one boy at my expense to the Calcutta National Weaving School. None else besides him.

35. He studied up to the 1st English class and was a menial servant of mine. He seemed to me to be very intelligent and willing to learn.

36 to 38. I sent him with a view to teach other weaver boys gratis when he returns.

39. None.

40 and 41. *Nil*.

F.—INDUSTRIAL ASSOCIATIONS.

42. *Nil*.

(9) P. SURYANARAYANA, Esq., *Rajam (Vizagapalam)*.

A.—AGRICULTURE.

1. Generally good.

2. Yes.

3. Good.

4. Landlords are prosperous but tenants are poor.

5. About $\frac{1}{10}$ on proprietary tenure ; the rest are tenants-at-will.

6 and 7. None.

B.—MANUFACTURING INDUSTRIES.

8. (1) Rajam, Pondur, Boddam, Kancharam, Mamidipille, Senavaram, Potnuru and Jami are the chief centres of cotton weaving and spinning. Chittivalsa has a jute factory.

2. Nakkapalli and Srungavarapukota are noted for lac and wood works.

3. Vizagapatam ivory and horn works are of world-wide fame.

4. Mining of manganese is carried on by English companies on an extensive scale in Chipurupalli and adjacent taluks.

5. Manufactories relating to leather, pottery, metals, oils, furniture, &c., are carried on in several parts of the district in a primitive style.

N. B.—The following remarks apply only to the textile industry which is the only one carried on on a large scale and upon which about 40,000 people depend for living.

9. The present condition is encouraging owing to the Swadeshi movement.

10. It was gradually decaying.

11. About 40,000.

12. Cannot be estimated.

13. Materially affected by competition with imported articles.

14. Bengal, Orissa, besides local market.

15. Enough of weavers to meet increased demand.

16. (a) Much, but the step is fraught with difficulties. (b) Improvement will be in proportion to the efficacy of the new appliances. (c) Much good can be expected. (d) Much expansion will be the result.

17 to 20. None could be named.

C.—MINERALS, &C.

21. Manganese, iron, graphite and mica.

22 and 23. None.

24. Manganese.

D.—CAPITAL.

25 to 27. None.

E.—TECHNICAL EDUCATION.

32 and 33. A carpentry class is attached to the Mrs. A.V.N. College, Vizagapatam.

34 to 41. None. Two young gentlemen went of their own accord to Japan to learn the making of pencils, soaps, matches, &c. They returned from Japan and left for England for the study of law.

F.—INDUSTRIAL ASSOCIATIONS.

42. There seems to be one at Vizagapatam but only in name.

Note.

The pencil factories at Bimlipatam and Anakapalle, the Vizagapatam Spinning and Weaving Company (Handlooms) at Rajam, the rice mills at Vizianagram and Vizagapatam, perfumes, soaps, matches of B. V. Nath of Vizianagram—all started since the advent of Swadeshism—show that Vizagapatam District has also partaken in the general awakening.

(10) G. V. SHRIKHANDE, Esq., *Saugor (C.P.)*.

A.—AGRICULTURE.

1. The condition of the agricultural industry in Saugor is not satisfactory as the district has been suffering from a series of famine years for the last decade and poor crops have taken the place of valuable crops. Cropped area of the last settlement was 933,864 acres ; at present it is 814,502 acres.

2. No. The district area is 2,564,480 acres. The Malguzari area is thus at present, including a few ryotwari villages, 2,029,844 acres. Of this 140,047 acres is not available for cultivation.

The net available area for cultivation is 1,899,797 acres, while the cultivated area at present is 920,022 acres inclusive of the new fallow ; or, in other words, the margin for extension of cultivation is still 51 per cent. on the total culturable area.

3. The general quality of the culturable soil is fairly good.

The area classified by soils at the last settlement is :—

Mar.	7,259	acs.	Rathia.	54,282	acs.
Mund I.	280,836	"	Patrua.	210,162	"
Do II.	301,082	"	Bhatua.	44,252	"
Baiyan	108,649	"	Kachar	1,141	"
Kabar.	27,026	"			

4. The landowning and cultivating classes are mostly indebted and their general condition cannot be said to be satisfactory.

5. Sir	125,196 ac.	Absolute occupancy.	158,260 ac.
Khudkast	88,064 „	Occupancy.	227,081 „
Malikmakbuza	37,119 „	Ordinary.	488,688 „

6. (a) No steps whatever.

(b), (c) and (d). *Nil*.

7. The system has not been introduced yet in this District.

B.—MANUFACTURING INDUSTRIES.

8. (1) Cotton industry is not now important in the Saugor District ; the decrease has been very marked during the last decade ; a little thread is still spun by hand, generally by women in the spare time and used in the manufacture of coarse carpets, bags and cloths.

For weaving, ordinary weaving cloth mill spun thread is now mostly used.

Cloth is woven to some extent in large villages all over the district ; the chief centres are Saugor, Rehli, Deori, Gourjhamar, Garhakota and Rahatgarh. White dhotis with red borders for men and red cloths with black borders for women are principally woven. In 1850 Garhakota was described as a chief cotton mart, the principal articles woven being “ addhas ” or cloths in red, white and black stripes, which were made into “ lahengas ” or skirts for women. Very few of these are, however, made now. The weaving castes are principally Kories and Chadars who weave only coarse cloth. There are a few hundred Koshtis in the district and a few houses of Momins or Mohamedan weavers in Saugor. These Koshtis make good “ saries ” and “ dhotijoras ” with silk, gold and silver thread. The Momins also turn out good specimens of cloth. A cotton press has been opened recently at Garhakota. Cotton cloths are dyed in Saugor, Rehli, Garhakota and Gourjhamar, but the industry is also decaying. Saugor is said to have been famous for its dyeing industry and to have had a large export trade in former times, but this has now altogether vanished ; many of the weavers now buy coloured thread.

Kusum or safflower, which was formerly extensively used as a dyeing agent, is now scarcely ever employed owing to its cost, and indigo and “ al ” (*Morinda certifolia*) though not entirely discarded, are being supplanted by aniline dyes. In 1890-91 there were 400 acres under indigo and other dyes, but practically none are grown now in the district.

Wool.—Coarse country blankets are woven from the wool of sheep by the “ Gardarias ” or shepherd caste, who combine this occupation with sheep-breeding and tending. The local supply is insufficient and blankets are imported from Bundel-

khand and Cawnpore. The local blankets are black, white or chequered in black and white. Blankets of superior quality are made in Khurai Tahsil. The blankets prepared at Khurai are called "ral." Some pinjaras in the Saugor City make "namdas" of unspun wool which are covered with cloth to form native saddles.

Silk is imported in small quantities for making borders of dhotis and saris and for preparing "kad" and "muktas." This is only used by the Koshtis in the town of Saugor.

Jute is neither cultivated here nor used for textile fabrics.

"Sun" (hemp) is grown in the district and is used in making ropes and "tat-pattis."

4 — POTTERY, PORCELAIN AND GLASS.

There are a number of potters in the district; nearly every village has a few Kumbars to supply its requirements for earthenware vessels which are used extensively for cooking and storing water and grain. The vessels are coloured red, white, yellow or black before being baked. The quality of the earthenware is generally superior to that of the Southern Districts, and the pottery of Shahgarh owing to some quality in the clay, has special reputation for strength and durability. The Kumbars also make bricks and tiles.

At the Dewali festival the Kumbars make "cheraghs," a variety of clay figures and ornaments and give them a glittering whitish colour with lime and mica: while the mochis make painted dolls and images of gods and animals.

There is a good industry at Saugor where Allahabad tiles are manufactured.

Porcelain is imported into the district. Glass bangles are made in Saugor, Pithoria, Garhola, Garhakota and Rahatgarh. Balls of rough glass are obtained from Cawnpore. The bangles made locally are now being superseded by those of transparent glass imported from Europe.

Rude glass bottles are made for holding sacred waters, scented oils and medicines.

Lac bangles are also made and are much used by females in the month of Srawan. Beads and necklaces of lac and ornaments for the ears and head are worn by children and women of the lower castes.

2.—VEGETABLE AND ANIMAL PRODUCTS.

Wheat and oilseeds, gram, cotton and ghee and "gad" are the principal articles of export. "Gu:" (raw sugar) is manufactured locally. These articles are chiefly exported from Saugor, Khurai, Binā, Bamora, Patharia and Kareli.

Cotton is mainly grown in the south in the Rehli Tehsil. Betel-vine leaves are sent to Northern India as also timber and grass.

Teak is the timber principally used for building and other purposes, while bijesal, saj, and koha are those next in favour.

Wood charcoal is used for smelting and bamboo charcoal for refining. Teak charcoal is generally used only by Lohars and Dhobis. Bamboos are plentiful and are used for building purposes, and basket and mat-making. These are now exported to Cawnpore.

Mahna, achar, and tendu are the chief minor produce of the district jungle; the flowers of the former and the fruits of the two latter trees are collected in large quantities for food by the poorer classes. From the seeds of the achar tree "chiranj" is extracted. Gum is largely collected from dhaura, khair and saj trees. This is used for food and for export.

Catechu is boiled from the wood of the khair tree. Lac is collected in large quantity though the lac insect is said to have died in the famine years. The other minor products are honey and wax.

Herds of small buffaloes are driven to Chhattisgarh for sale from this district.

3. LEATHER, HORN AND PAPER.

Other exports are hides, horns, bones and skins of cattle. Considerable quantities of sheep skins are also sent away; these are used for making drums, bookbinding and also for shoes. The skins and horns of the antelope are also exported in small quantities for ornamental purposes.

The export of dried jerked meat has recently become an important and lucrative trade with Burma and Madras.

Big slaughterhouses have been established at Saugor, Khurai and Rahatgarh where about 1,000 heads of cattle are slaughtered daily during the working season.

Formerly paper was made in this district but the industry is now extinct.

Leather industry in Saugor is also most important. It is, however, a village and not organised industry. The Chamars make articles of leather used in agriculture and also shoes. Saugor shoe is noted and is even exported. Better class of shoes have ornamental designs worked with silk, cotton thread and lace; shoes are mostly made in Saugor and Rahatgarh.

There are good carpenters in towns who turn out high class work and English furniture. Ornamental wood-carving is also

done to order and some of the temples and houses contain very good specimens of this work.

Kanderas or turners make tops, toys, cups, chessmen, "haggas" and other articles, and also do lacquer-work. Bamboo-workers also muster strong in Saugor.

8.—MATERIALS USED IN CONSTRUCTION.

The district of Saugor abounds in good materials for building purposes. It has good clay for bricks and tiles and fine Vindhyan rocks, yielding sandstone, which is well adapted for building purposes and a number of quarries are worked. The best are at Rahatgarh and Maswasi near Saugor from which large slabs are obtained. The houses in several villages are built and roofed entirely with sandstone slabs.

Teak and other timber is plentiful.

9, 10 and 13. The present condition of all these industries, having come in contact with cheap machine-made articles, is quite unsatisfactory, declining and decaying. Before this their condition was much better.

11 and 12. Statistics are not available.

14. These industries, as has been stated above, supplied mostly local demands and surplus products were exported to surrounding districts.

15. Land and labour is still comparatively cheap at Saugor and will facilitate any increase in the supply, if a demand arose.

16. The existing industries are capable of expansion—

(a) by making advances to artisans at low rates of interest ;

(b) by improvement of the appliances in use ;

(c) by the imparting of special instruction, and

(d) by the employment of power machinery.

17. Almost all the industries described above still exist but in a decayed form.

18. Cheap foreign articles in the market without any protection or appreciation for the locally made articles.

19 and 20. Cotton goods, dressing and curing of hides and metal works can be much improved with profit by the means noted under head 16. Saugor had formerly a large industry of gold and silver workers, but they are now hard put to it to make a living. There are a few Sonars at Khurai and Itawa and one or two in most large villages. They prepare the ornaments of gold and silver used by the people, besides plates, chains, bells, bones, etc., etc. Souar's son sits all day

with his father watching him work and handling the ornaments ; they also receive some training in freehand drawing at home.

Ornaments are now also largely made of bell-metal by the sub-caste of Andhia sonars. Eating and drinking vessels are also made of this mixed metal, but they cannot stand fire and cannot be used for cooking purposes. Bell-metal industries exist in Saugor, Pijora, Jaisinghangar, Rahatgarh, Isurwara, Deori, Khimlasa and Malthone.

Brass and Copper work.—Water pots and dishes are made of these metals by the hammering process, while drinking and cooking pots, instruments, idols and toys are mainly cast. Copper horns for use as musical instruments are made at Malthone, and sent outside the district. Brass working industries exist at Saugor, Khurai, Itawa, Garhakota, and Rehli.

Iron works.—Most villages have a lohar or blacksmith who makes and mends agricultural implements. Imported iron is now principally used and many articles are imported ready made by Bohras, but cooking utensils made of iron and melted at Hirapuri and Barkhera villages in this district are preferred to the imported articles. Ornamental iron nut-cutters are made at Deori. Some lohars in Saugor can make good and strong locks.

6. CHEMICAL INDUSTRIES.

The local Vaidyas and Hakims prepare their "Matras and medicines." The "attars" produce different "Itras," scents, scented water and 'sharbats.'

7. FURNITURE AND DECORATIONS.

Carpenters are found in most villages who make the wooden implements of agriculture. There are a few good workmen.

C.—MINERALS AND OTHER NATURAL PRODUCTS.

21. Deposits of iron are found in the north of the district in the villages of Tigora, Heerapur, Baraitha and Amarman—all of the Banda Tahsil.

The mines near the latter village are in Government Forest. This Department lets its mines to a contractor for a small sum and iron workers pay him. In the other mines any one is free to extract ore in payment of a royalty of as. 8 per year on each furnace maintained. The number of furnaces has decreased in recent years. In 1899 there were 78 furnaces ; in 1903 there were only 31.

Sandstone of a superior quality is found in Rahatgarh and Maswasi and in Shahgarh soft stone is obtained which

is made up into cups and vessels. The red clay found in Shahgarh is worked up into earthenware of a good quality and superior strength.

Mica exists at Baraitha, but is not worked.

22. Iron and sand stones are used in the district.

23. None except a little iron which is sent to Cawnpore.

24. Hides, horns and bones.

D.—CAPITAL.

25. None except the local money-lenders.

26. Nope.

27. *Nil*.

E.—TECHNICAL EDUCATION.

28. None whatever. Recently a class has been opened in the High School for the sons of Lohars, Sonars and carpenters where drawing is taught.

11. M. VENKANAH, Esq., Vizianagram.

A.—AGRICULTURE.

1. The district of Vizagapatam is the largest in the Madras Presidency. More than nine-tenths of it consists of Zemindary land, and of the remaining only a fifth comes under *inam*. Hence agricultural statistics are available only for the *ryotwari* and minor *inam* lands in the three Government taluks of the district. The maritime plain and most of the valleys in the Agency Tracts are very fertile. The old tools and implements with which agriculture has been carried on from time immemorial are still in vogue everywhere. The ploughs, the seed drills and other appliances are wholly unsuited to modern requirements and are susceptible of considerable improvement. On the whole the soil is fertile, yielding abundant crops, such as paddy, cambu, ragi, gingelly, gram and cholam. Owing to the high prices which jute has been fetching of late, a large area which has hitherto been under 'wet' cultivation is now brought under jute as being more lucrative. Sugar-cane is extensively cultivated in the Palkonda Taluq and in the valley of the Sarada round Anakapalle. Formerly cotton and indigo were grown over a wide area, but since the discovery of the artificial dye, the latter has been abandoned, with the result that the numerous indigo factories scattered over the district are to be found in a crumbling and dilapidated condition, having been overgrown with cypresses.

2. The district may be divided into two portions, namely, the Agency Tracts and the plains. The former is hilly and is covered with dense and impenetrable forests. The greater part of the cultivable area in the inland parts is brought under cultivation. There is, however, no inconsiderable land in some of the Zemindary tracts which has been left 'uncult' and 'allow.

3. The soils of the district as classified in the three Government taluks divide themselves into the two main groups of red ferruginous and black, which may again be subdivided into clays, loams, and sands. The black soil is chiefly found in the alluvial valleys of the streams and rivers, the higher land being usually red.

4. The major part of the population live by agriculture, and in the absence of any industrial activity worth speaking of, they have no alternative avocation to which they can readily take in the event of the failure of the monsoons.

5. The system of tenure in the Zemindary tracts which denies occupancy right in the land does not tend to improvement or careful cultivation of the soil. The Zemindars do not encourage the pauper cultivator and let the land to tenants of substantial means. In most of the estates the ryots do not enjoy a fixity of tenure and the assessments are constantly and avariciously enhanced at the sweet will of the Zemindars. Moreover, most of the *pallas* granted by these Zemindars contain the most rigid and ungenerous stipulations, such as that no trees shall be felled or planted by the tenants without permission and the custom of paying the Zemindar in kind. In these circumstances it is not unnatural to find that the ryots as a class should be wallowing in abject poverty in the Zemindary tracts, while the condition of those in the Government taluks fares no better.

6 (a) There is no supply of cheap capital in the district to finance agricultural or any other industry. The cultivators borrow from the Sowcar at usurious interest with the result that they find themselves unable to refund either in cash or kind, and after undergoing the privations and harassments consequent upon litigation in the Indian civil courts, turn out coolies or labourers or migrate to the more fertile parts such as the Godavari District or Burma in search of livelihood.

(b, c) In 1904 the District Agricultural Society was formed and cattle shows had been held at Vizianagram, Kasimkota and Bobbili. Practical demonstrations in ploughing with new and improved implements were held for the benefit of the agriculturists. But owing to extreme poverty of the ryots, they are unable to avail themselves of these

advantages. From the very outset the Association which has been under official control, does not show much vitality, nor have the public any reason to enthuse over its results so far.

(d) There is hardly any doubt that the soil is gradually becoming infecund, *pace* Dr. Voelcker. Water and manure are the chief wants of the ryots in the district. There are, however, many small rivers, but as they flow mainly through the Zemindary tracts, their contents are not utilised for irrigational purposes on a large scale. The ryots depend mostly on wells, tanks and mountain streams, and in the event of failure of monsoonal rains, they have nothing to fall back upon. Everywhere cow-dung, which is largely burnt as fuel, is used as a manure, but it does not fertilise the soil proportionately to the loss sustained every year. It is only in places adjacent to Municipal towns that night-soil can be procured and utilised as a manurial substance. The outlying fields of the villages are fertilised with the litter of cattle-sheds and the urine of farm animals. The ryots are ignorant of the use of mineral and artificial manures.

7. It is a pity that the district has not yet taken advantage of the Co-operative Credit System.

B — MANUFACTURING INDUSTRIES.

8. Next to agriculture cotton weaving is the chief occupation of the people.

(1) Rugs and carpets are made at Jami in the Srungavarapukotu Taluq. They are also woven at Anakapalle and Payakarowpeta in the Sarvasiddhi Taluk. In the east of the district the weaving centres are Rajam, Siripuram, and Ponduru, three neighbouring villages in the Palakonda and Chipurupille Taluks. In the first named coloured cloths are woven which are of a soft and exquisite texture. They are not only sold in the plains, but also sent in large quantities to Ganjam, Orissa and Bengal. Weaving is also carried on in Siripuram and Ponduru where women spin a fine gossamery yet strong thread which approximates to 150's and weave cloths which are famous for their softness and durability. Other places where cotton weaving forms an important industry are Vizianagram, Duppada, Jonnavalasa, Denkada and Anakapalle.

The local jute is spun and woven into gunny-bags by steam at the mill at Chittivalasa near Bimlipatam. In a few villages near Palakonda, Anakapalle, and Vizianagram jute fibre is woven into long strips of gunny which are cut up and stitched into bags.

(2) The chief centre of jaggery trade is Anakapalle where sugar cane is now largely grown. Iron mills are used there for pressing the cane. Messrs. Parry & Co. have been encouraging the cultivation of cane by advances of money and improving the quality of the jaggery manufactured by hiring out to the ryots metal vessels for the storage of the juice in place of the earthen pots generally used by them. Jaggery is also manufactured on a large scale at Rayaghada and Palakonda which are situated on the outskirts of the plains. The oils used in the plains are all made in the primitive wooden mills in almost every town and village. Castor oil is prepared in Vizianagram in two mills which are more or less paying.

There are two rice mills in Vizianagram which were started only last year.

There are three tanneries in Vizianagram and one at Jeypore. All of them are owned by Mahommedans. Tanned hides and skins are exported on a large scale from the port of Bimlipatam.

Large quantities of horns are sent from the Agency and are exported to foreign countries.

Vizagapatam is the centre of ivory work in the district. The industry is in a flourishing condition and has won medals at Exhibitions. Fancy articles such as chess-boards, photograph frames, card cases, and trinket boxes are made from tortoise-shells, horns, porcupine quills, and ivory combs of exquisite pattern are also prepared and largely patronised by Europeans.

Lacquer work is done at Anakapalle, Chandanada, Etikoppaka, Lakavarapukota and Srungavarapukota.

Wood of fine quality is turned on the primitive lathe and lac of various colours is then applied to it. The articles made in the places consist of cots, toys of different kinds, chess-boards, small boxes, tumblers and platters.

Glass bangles are made in several villages round about Anakapalle, Yellamanchili, Chipurupalle, Vizianagram, Paidipalem, and Navarangapur.

A pencil factory called the 'Krishna' Pencil Manufacturing Company has been started at Bimlipatam. The plant and machinery are fresh and cost about Rs. 15,000. The daily outturn is encouraging and with efficient and more economical management it will prove a very paying concern. The factory is managed by a Bengalee expert who underwent training in Japan.

(5) Fine work in gold and silver is done at Rajam, Bobbili, Parvatipore and Vizianagram. Cups, rose-water sprinklers, small silver boxes and vessels are neatly executed in these places. Ornamental work in gold and silver is done

in Vizagapatam and Vizianagram. Brass and bell metal work is usually done by the Kancharis in Parvatipore and Anakapalle, Bobbili, Somalingapalem, Ellamanchali, Anantavaram, Lakavarapukota. The work consists in casting vessels and utensils and giving them a fine polish.

(7) Wood work such as cots, chairs and tables is done at Vizagapatam and Tallavalsa.

(8) Materials used in construction are to be had in abundance in the district. Since the major portion of it is hilly, rocks and stones are procurable everywhere. Lime is quarried throughout the district and shell-lime is produced on the littoral tracts. The Agency supplies large quantities of wood for building houses. The inner valleys of the hills in Palakonda are full of iron-wood (*Xylia dolabriformis*), satin wood (*Chloroxylon Swietenia*), and other varieties of timbers. Among the most characteristic trees in the hills are the *nulla maddi* (*Terminalia tomentosa*), *Cedrela microcarpa*, *Buchanania Latifolia*, *Pterocarpus marsupium*. Noticeable among the hills are *Shorea robusta*. Bamboos are exported, but teak wood is very scarce.

(9) & (10) It is sad to find that many of the industries, if not all, enumerated above, were once in a flourishing condition, but are now slowly but surely decaying.

(11) According to the last Census Report the population supported by agriculture in the Agency is estimated at 699,069, the percentage of the agricultural population being 82.14; the percentage on agricultural population of actual workers is put down at 44.41, while the dependents are 55.58. The population supported by agriculture in the plains is 1,431,158, the percentage of agricultural population being 68.71; the percentage of agricultural population of actual workers is estimated at 64.05, while the dependents are 35.94.

(13) Of the industries which have been affected by imported articles, weaving of cotton goods may be mentioned first. Fabrics below 40s are not affected by foreign competition, while those above that count have gone down. The lower classes use the former, while the middle and upper classes go in for the latter. The lower classes are, therefore, true but unconscious Swadeshists.

(14) *Vide* remarks on the cotton industry.

16. (a) The establishment of Co-operative Credit Societies will go far to advance the existing industries by financing them at low interest.

(b) New and improved tools and implements will the agricultural and other industries.

(c) The opening of Experimental Farms and demonstrations in weaving on handlooms by experts will prove useful in expanding the existing industries.

(d) The Raipur-Vizianagram Railway which is now in course of construction will open up the Agency to trade and commerce. A jute factory wholly manned by natives and located in the centre of the jute-producing tracts will prove a very paying concern.

A sugar factory at Palakonda or Rayaghada, or at Anakapalle, a comb factory and chrome-tannery at Jeypore may prove advantageous to enterprising capitalists.

17 and 18: Indigo-making was a great industry and the whole district is still dotted with deserted indigo-vats and factories.

The trade has dwindled to nothing since the discovery of the German synthetic dye.

C.—MINERALS AND OTHER NATURAL PRODUCTS.

Agency Natural Products.—Paday, ragi, cholam, cambu, gram; gingelly, niger and mustard; saffron, turmeric, garlic, arrow-root; tamarind, soap-nut, ginger, and long pepper; honey and wax, horns, hides and skins; dammer and lac; marking-nut, myrabolams and tanning barks.

Mineral Products.—Iron is made from the local ores and smelted on a small scale in the Agency.

Plains.—*Natural Products.*—Paddy, ragi, cho'am, gingelly, and jute.

Mineral Products.—Manganese ore.

D.—CAPITAL.

(25 and 27) There are no banking facilities for the support of industries in the district.

E.—TECHNICAL EDUCATION.

There are no facilities for imparting technical education in the district.

F.—INDUSTRIAL ASSOCIATION.

There are two Industrial Associations in the district, one of which is located at Vizagapatam and the other at Vizianagram.

12. G. LAKSHMANNA, ESQ. AND G. RAMACHANDRA RAO, ESQ., *Rajahmundry.*

A.—AGRICULTURE.

1. In the Godavari District, the condition of the Agricultural Industry may generally be considered satisfactory

Many kinds of grains and corn, cotton, cocoanuts jute, tobacco, etc., are grown in abundance. But the chief product is paddy of various sorts and qualities. This year the lands suffered much for want of seasonable rain, which is scanty during the last quarter of the year, the most important period for agriculture. Even in the Delta canals the usual system of supplying water on a free scale has been modified by the introduction of changes by the P. W. Department. So, for want of water, the crops this year present an unhappy condition and fore-shadow no good results or harvest.

2. Yes. Almost the whole of the cultivable soil is under cultivation. In the present season the various villages and especially the fields by the side of the canals present a vast ocean of waving green corn extending as far as and even beyond what one can see. This is due for the most part to the canals and the great Godavari anicut, which stores water in the river during the hot months.

3. For the most part the soil is fertile and produces many kinds of grains. In the *Lankas* or islands in the river, excellent tobacco is grown in abundance. In the Amalapur Taluk cocoanut trees are grown in a healthy way.

4. Not quite satisfactory except in the case of the Zamindars who are few in number. The taxes are heavy and greatly oppress the cultivating classes. Added to this the meagre and unsatisfactory supply of water has created great discontent amongst the cultivators against the Government. The Delta Superintendent and the Revenue Inspector ought to be improved in their pay so that their demands on the cultivators may be few and far between.

(1) Under the first tenure few lands are held,

(a) Neither the Government, nor even individual proprietors on a large scale, supply cheap capital to the ryots. The former is ever ready to "wring from the hard hands of peasants their vile trash," i.e. the taxes regularly and mechanically without any the least mercy even in unfavourable years; while remission of taxation is a thing unknown in this district during even the worst famine years. In certain cases no doubt the Zamindars and proprietors unwillingly supply capital beforehand, though not at a cheap rate, lest their fields become barren and yield no produce on account of the wretched condition and the miserable poverty of the ryot.

(b) No private individuals introduce scientific methods or give practical instruction to the ryot. But the Government, through the beneficent influence of Mr. Alfred Chatterton, opened an experimental farm at Samalkota where sugar-cane and other articles are grown on scientific methods and by resort to good and useful manure. This farm is opened

here so that the cultivators may be benefited by examining and following the not complicated or difficult methods followed by the agriculturist in this new experimental farm.

(c) Generally speaking no improved implements are employed. However, of late the Samalkota Experimental Farm is introducing slightly modified and improved implements which can be easily adopted by the ordinary cultivator.

(d) No improved kinds of manure are used ; but the old sorts are still in use everywhere. The farm at Samalkota referred to above is making an innovation in the matter by using scientific manure.

7. No Co-operative Credit Society was started in this district as yet ; but a District Agricultural Association was formed with the District Collector as the President. But even this Society seems to have produced no good results or in any way affected for better the condition of the peasantry or even of the members thereof.

B—MANUFACTURING INDUSTRIES.

8. (1) *Cotton*.—The manufacture of cotton goods is plentiful throughout the district. For the most part this industry is carried on by the weaving classes on their old and unimproved looms. Very fine cloths (dhoties, saris, etc.,) are produced at Uppada (near Coringa), Thatipaka (near Nagaram), Bendemurlanka, Mora and various other places even to 200 counts and more. At Zampeta (Rajahmundry), Mandapata, etc., beautiful checks for the use of coats and shirting are made and exported in large quantities to other provinces in the country. A small factory of improved handlooms was recently started at Nidadavole with the modest capital of Rs. 12,000, but it appears not to be in a flourishing condition. Improved looms are also used here at ajahmundry, Mandapata and other places. Cloth is woven at Cocanada out of plantain fibre. A new experimental farm was opened at Rajahmundry by Mr. S. Veeraswamy in which the perennial varieties of long-stapled cotton is grown. From this cotton, yarn used in Dacca muslins can be spun. The trees are growing luxuriantly.

Wool is used in the manufacture of carpets at Ellore and in the Central Jail, Rajahmundry.

Silk—Nil.

Jute.—A Jute Mill was constructed recently at Ellore (now in the Krishna District) with a capital of about 7 lakhs of rupees, the greater portion of which amount was collected by shares. The factory began work a few months back under the supervision of Mr. McIntosh, a Scotch Jute Expert. About 700 labourers are employed in it and the work is going

on satisfactorily. The gunnies manufactured are not exported to any distant places ; but are consumed here only in the Godavari and Kistna Districts ; and yet the mill is unable to supply the demand of even these two districts. This is the only large factory in our district ; and if it were placed under good management and yields good profits or dividends, many more factories will surely arise in the district. For the people here do not require an innovation or a guiding example to follow in the same path, be it good or bad. It is thus that hundreds of mushroom provident companies were started but the infant mortality amongst these companies was almost 100 per cent. Now a large number of rice mills also are arising in a similar scale. Hence, if but this jute factory is made a useful and profitable concern, it will have rendered great benefit in the construction of factories in this district. But if this, the first bold venture fails, it will do incalculable mischief and create great difficulties in undertaking profitable concerns on a similar scale.

Sugarcane, which grows in abundance in the district, is made use of in the big factory at Samalkota belonging to Parry & Co. In this factory, refined sugar and rum are manufactured and this factory supplies the demand of sugar and rum in this district.

Not much of leather or horn industries. There is not a single mill for the manufacture of paper. Hides are exported in large quantities to foreign countries.

(2) *Pottery, porcelain and glass.*—Nil.

(3) *Metals.*—Nil.

(4) *Chemical Industries.*—Nil.

With regard to furniture, the carpenters here supply only the local demand ; but no export trade is practised.

9. The chief industry of the district is handloom weaving. There are fine workmen who can produce beautiful cloth and of a durable texture. For want of patronage and appreciation these looms had fallen out of use during the last two decades or more. But it is refreshing to note that the *Swadesi* and *Boycott* movements have once again revived this once famous industry and the weaver classes and the handlooms are up again and doing excellent work. Without exaggeration it may be said that during these famine days the *Swadeshi* movement saved the weaver classes from poverty, wretchedness and hunger. However, much more remains before us and we hope gradually to improve the present industries and supply cloth of all kinds on a large scale to other parts of the country as we are doing on but a small scale at present.

11. It is difficult to give numbers in answer to this question ; but we may roughly say that there are over 50,000 people employed on the handloom industry in the various towns and taluks throughout the district. In the rice mills themselves, which abound in the district, there are employed about 10,000 coolies. In the jute mill at Ellore some 700 labourers are working, while also a large number are engaged in the weaving of carpets which industry is in a flourishing condition at Ellore and is in need of patronage and appreciation from the country,

12. The capital of the jute mill at Ellore is over 7 lakhs Rs. while rice mills in the district should have cost not less than at least 15 lakhs. In Rajahmundry itself there are about half a dozen of these rice mills.

With regard to the weaving industry, it would not be possible to give even rough figures of the capital employed. The poor and destitute weavers invest what little amount they own, and have to wait, till the cloth produced therewith is disposed of, for again putting more money into the industry. They are sadly lacking in capital : Organised work, recourse to starting handloom factories on the basis of Joint Stock Companies and providing these village weavers with advances would largely increase the present outturn of cloth. The capital of the sugar factory at Samalkota seems to be over 5 lakhs of Rs.

13. I shall under this heading take only cloth which is the most important industry in the district and has a great future before it. With regard to *Dhoties* (cloth for weaving) during the last two decades or more the Manchester *mull* has achieved an importance and sale which cannot be described. Every one and especially the educated classes would wear no other cloth but this foreign *mull*. Just before the *Swadeshi* movement came into importance ; the foreign Mull commanded the markets and reached the climax or zenith of its importance. But the *Swadeshi* and Boycott movements have struck a strong blow at this foreign cloth. Gradually, the use of this Mull began to decrease and our *Swadeshi Dhoties* are once again taking its place. Thus we find that the foreign goods are gradually giving place to *Swadeshi* ones. The same rule about the Manchester Mull applies as well to checks and cloth used for coats and shirting. The one article that the district is sadly lacking in production is woollen cloth. In this direction, the foreign article still commands the local markets,

14. At present the handloom cloth woven by the weavers is not only able to supply the demand in the district ; but is also exported to some extent to other provinces and

cities, especially Calcutta and Madras. Zampeta checks also are exported even in greater quantity to Madras and the neighbouring districts ; while Ellore carpets command a sale throughout the country, but have of late experienced a perceptible fall for want of patronage.

15. If demand increases, there is no doubt that production as well will increase in a proportionate degree. Men of moderate means are ever ready to help production by paying advances to weavers, or by opening looms of their own accord to supply demand. It is only necessary that the few Zamindars of our district should cast off their lethargy and torpor and take advantage of the times by investing large capital in the construction of factories and mills. The very fact that, since the advent of the Swadeshi movement, the old weavers have once again taken to their looms in large numbers and are producing cloth of different qualities and kinds to supply the demand indicates that there will be no drawback in production, if only there is demand.

16. Even now, some expansion is apparent in the industries by advances being made by wholesale dealers and shopkeepers. But the present advances are but meagre and extend only to a few cases. Surely the existing industries (we mean the industry of cloth which is the chief one in the district) is capable of *great* and even *rapid* expansion if only " advances are made to the artisans at low rates of interest." For this purpose an Industrial Bank or something of the sort is required.

By the introduction of improved appliances great progress can be and will be achieved in the Industrial field. Thus at Rajahmundry, Nidadavole, Mandapeta and other places in the district, improved handlooms and fly-shuttle looms are introduced ; and it is gratifying to note that good cloth of a fine and beautiful texture is produced there. It is hoped that the weavers would learn from these improved looms and introduce the same in their own homes thus saving labour, time and money.

The weavers in the District sadly stand in need of special instruction in improved machinery. Some two years back steps were taken to impart instruction to weavers and for this purpose an improved loom and a Bengalee expert were brought here from Calcutta ; but this instruction did not last long as it was given up a few months later. Great progress can be achieved by imparting instruction to the artisans in the district by special experts on improved looms, instruments and machinery.

Power machinery would greatly increase the industries. Thus we find a practical illustration of this in the Ellore Jute

Mill and the various Rice Mills in the district. In a few years, we hope to start some factories, through the wealth and munificence of our Zemindars and with the help of practical knowledge of several of our young men, who had gone to Japan and other foreign countries to learn various industries. Further it is reported that the Raja of Pittapur will shortly construct a factory with a capital of 12 lakhs of Rs. for ginning, spinning and weaving of cotton.

17. The carpet-weaving industry of Ellore used to be in a rather flourishing condition some decades back. The carpets produced there were highly valued and praised in distant places in India and even in foreign countries. The Ellore carpets had a great name throughout the country and were being used by Zamindars and Rajas in their palaces. But during the last two or three decades they have decayed.

18. The decay of Ellore carpets is chiefly due to want of patronage and appreciation from elsewhere. The Government Central Jails at various places in the Presidency are now producing carpets in large numbers and this has to a large extent handicapped the carpet industry of Ellore. Even now there are a few companies of weavers employed in carpet weaving at Ellore.

19. Yes ! It is practicable to revive the once famous carpet industry of Ellore.

20. The carpet industry of Ellore can best be revived by a wide patronage and appreciation of the same by the wealthy classes of the country. The weavers employed in this industry are in a poor condition and require the help and co-operation of rich men. A practical means of infusing life into this industry is by starting a company on a large scale for this industry, wherein these intelligent weavers can be employed on reasonable salaries.

C.—MINERALS AND OTHER NATURAL PRODUCTS,

21. So far as our knowledge goes no valuable mineral products can be had in the District. But in the Agency Taluks, *mica* is found and now some Europeans are engaged in the digging of this mineral product.

The Agency parts abound in large forests where valuable timber, especially teak, can be had in large quantities. These teak trees are brought to Rajahmundry in large numbers and afford great trade.

22. The mica ore is sent abroad by the Europeans employed there to foreign countries, but is not manufactured in the district.

23. As we have said in answer to the above questions, mica, the only mineral product to be had in the District, is exported abroad.

24. *Nil.*

D.—CAPITAL.

25. There is no special Bank in the district for the support of the industries ; but there is a branch of the Bank of Madras at Cocanada which lends money on mortgages.

26. *Nil.*

27. *Nil.*

E.—TECHNICAL EDUCATION.

28. Amongst the general class of ordinary weavers the training is undergone in their very homes, as there is a special caste which is hereditarily attached to this industry.

Also training on improved looms is imparted in the handloom companies at Nidadavole and Rajahmundry. But there is no special school, where weaving is taught as an art by itself. A few years back a Bengalee expert and an improved loom were brought from Calcutta and a weaving school was opened at Zampeta (a suburb of Rajahmundry) inhabited by a large number of weavers. But unfortunately this weaving school had a premature death and there is not a trace of it left behind.

The National school which the citizens of this district intend opening at Rajahmundry shortly will impart Technical and Industrial instruction in conjunction with liberal Education.

29. There are no special schools, as mentioned in answer to the above question, for imparting instruction or training in the industries of our district.

30. In the generality of the weaver classes, instruction is given only in the practice of industry in a hereditary succession from the very childhood of boys ; but no instruction in the principles which underlie the industry is given.

31. There are no schools at all. The one school opened at Zampeta (near Rajahmundry) some years back, fell a victim to infant mortality after living for two or three months.

32. No.

33. There are no such schools at all ; but I hear there is a movement abroad to start rural schools in the various villages by the Government wherein it is intended to impart instruction on agriculture, carpentry, the smaller industries, etc., from the very lowest classes ; and give good practice to the eye and the hand in the earliest stages as is done in Germany, and other countries on the Continent.

34. Yes! The following are the names of the students and the countries they left for.

- | | |
|------------------------------------|--------------|
| (1) Vangala Venkata Narayana, B.A. | ... Japan. |
| (2) Alapati Gopala Rao | ... Japan. |
| (3) Goteti Janaki Ramiah | ... Japan. |
| (4) Mallampalli Narasimham | ... England. |
| (5) Evena Satya Narayana | ... England. |

Besides the above students who had gone to foreign countries, about half a dozen young men went to Bombay, Poona, Calcutta, Meerut, etc., to undergo training in the manufacture of candles, soaps, etc., and also to receive instruction in Mechanical Engineering in the Victoria Technical Institute at Bombay.

35. Of the five students that went to foreign lands the first, Mr. Venkata Narayana, is a graduate of the University of Madras, who passed high in Chemical Science. The fourth Mallampalli Narasimham, passed the Matriculation (Entrance) examination and was studying in the Senior F.A. class when he left together with the fifth a few months back for England. The other three young men (Nos. 2, 3, 5) studied as far as the Matriculation class.

36. It may be worthy of note to mention that almost all the above students (excepting the first) left the country without the knowledge of their parents or guardians. The first alone, Mr. Venkata Narayana, left some 2 years back for Japan, having been provided with a scholarship of three thousand rupees by the *Alamur Provident Institution*, whereas with regard to the other four, the second and third, Alapati Gopala Rao and G. Janaki Ramiah, left India some 20 months back for Japan without the knowledge of their parents. The former is the only son of one of the richest merchant princes of Rajahmundry and took with him (providing expenses, etc.) his friend Mr. Janaki Ramiah. They are still in Japan. They underwent training in the manufacture of soaps, candles, biscuits and glass and porcelain; while the fourth and fifth, Messrs. M. Narasimham and E. Satyanarayana, also left for England some 3 months back without the knowledge of their guardians.

37. The reply to this is found in the answer to Q. 34. Two are being trained in Japan and the remaining two in Great Britain.

38. With regard to Messrs. Gopala Rao and Janaki Ramiah, as I mentioned in answer to Q. 33, they shall, I hear, in a few months buy machinery in Japan necessary for the construction of a factory for the manufacture of glass and porcelain ware, for biscuits, and then go back to India together with a Japanese expert, whom (I hear) they engaged

on a monthly salary of Rs. 250 or thereabouts. So they will manage the factory to be started by Mr. Bhaskara Ramayya, while the other two, Narasimham and Satya Narayana, left for England only a few months back and it is not yet clearly known what they are studying there. So we need have no anxiety about their future course so soon. They are in well-to-do circumstances and the latter is owner of a large property (several lakhs) a part of which he will no doubt employ in the enterprise after returning to his native land some two or three years later.

39. Yes. There is at present one young man, Mr. Van-gala Venkata Narayana, B.A., who returned from Japan a month back after undergoing full training there—both theoretical and practical—in the following industries:—Dyeing, Calico-printing, manufacture of soaps and candles, etc.

40. At present Mr. Venkata Narayana is doing nothing. He says that the best and most useful industry he had undergone training in is dyeing and calico-printing and that a capital outlay of some 5 to 6 lakhs of rupees is required for opening a factory for dyeing and calico-printing. But, so far, no such amount is forthcoming and so his scientific and expert knowledge in these industries may after all prove futile, if no capital is made available.

He says, failing this project, he intends starting a soap and candle factory at Rajahmundry with a capital of Rs. 50,000, which some wealthy citizens of Penumantra seem to have promised to advance.

41. It is not advisable that Mr. Venkata Narayana's great knowledge in the important industries of dyeing and calico-printing should go unutilised. If no single individual—if there is any such, it should no doubt be a Zamindar or a Rajah—is coming forward to advance the whole capital of Rs. 5 to 6 lakhs, then I think it is the incumbent duty of the leaders and wealthy merchants of the district to co-operate at once and collect the required money and in the form of shares for a joint stock company wherewith the factory can be constructed as was done in the case of the Ellore Jute Mills.

42. At present there is no Industrial Association in our district. But over an year back a District Association was started at Rajahmundry with Mr. S. B. Sankaram, B.A., as its Secretary. Under its auspices he delivered some speeches on industrial subjects in the Town Hall and collected money on the Deepavali day two years back from every house at Rajahmundry. This money which amounts to nearly Rs. 250 was spent in buying a loom and bringing a Bengalee expert who opened a school and taught handloom weaving to the

local weavers on the improved loom for a few months. But all this activity of the Association died away and it has practically no existence at present.

(13) BABU PURNENDU NARAYAN SINHA, *Bankipur*.

A.—AGRICULTURE.

1. The Bihar cultivators are well known for their intelligence and they are hard-working. They have got a traditional agricultural lore, rich in useful information.

2. In some districts the whole of the culturable area has been brought under cultivation; in this, the greater portion.

3. The general quality of the soil is clay, clay loam and sand-loam.

4. There are big and small landholders, rich and poor cultivators. They are generally well off, but a large class of cultivators live from hand to mouth and many of these are badly off, specially in the congested district of Arrah, where there is more labour than land.

5. The class of tenant proprietors is increasing gradually. Most of the tenants have occupancy, only a small percentage form tenants-at-will. In Diara lands the tenants are mostly tenants-at-will.

6. (a) *Nil*.

(b) The Divisional Agricultural Association with its District Associations is trying to spread scientific and practical instruction in agriculture. This Association is under Government auspices.

(c) The Association is trying to introduce improved appliances.

(d) The Association is trying to introduce recuperative processes.

7. The system has not yet been introduced in the district nor in Bihar.

B.—MANUFACTURING INDUSTRIES OF PATNA DISTRICT.

8. (1) Textile fabrics.

Cotton—Town of Bihar—Dhotis, charkhanas, dupattas, saris, imitation Dacca muslin,

Khasrapur and Dinapur—Table cloth, towels and bed-sheets.

Fatwa—Charkhanas, napkin.

Patna City—Durries.

Wool—Patna City—Woollen carpets, asris.

Bihar—Woollen wrappers.

Silk and Mixed—Bihar—Dhoti, dupatta.

Jute—*Nil*. Fatwa—Bapta and charkhanas.

Embroidery, embroidered cloth of sorts, lace, embroidery threads—Patna City.

(2) Vegetable and animal products—Sugar, gur (molasses), castor-oil, linseed-oil, mustard-oil, castor, linseed and mustard cakes, safflower—dye, flour, pickles, butter, soap.

(3) Boots and leather straps.

(4) Glass made articles. Glass is blown and made into several fantastic shapes, flower stands, teapots, sticks, etc., with the help of simple implements. This is one of the oldest industries of Patna City. Glass-bangles or churis. Glass tickles or forehead drops.

(5) Steel trunks, portmanteaus, despatch boxes in Patna City.

Iron railings, iron gateways, iron benches—Dinapur and Bihar School of Engineering. Cutlery—Dinapur.

Brassware.

Tinware.

(6) Photography and painting,

Electro-plating,

Ink.

(7) Drawing-room furniture, carriages, wood-carving, house-painting.

(8) Building materials (except iron beams).

9. The industries are in a good condition, except carpet industry, which is decaying.

10. Towel, table cloth and bed sheet industries are of a recent origin; so are steel trunks and iron industry and soaps. Butter industry is largely encouraged by Railway Refreshment Rooms. Of the old industries carpet and wood-carving are decaying and also the dye industry.

11. I cannot give the number for which reference may be made to the Census Report.

12. This requires detailed enquiry for which there is no time. Besides, the capital must vary from year to year.

13. Vegetable dye has suffered from importation of chemical dye,

The prospect of textiles generally is brightening, though they had suffered before.

14. Only the following articles have more than a local demand and are sent to outside markets.

(i)—Table cloth, towel, bed-sheet, napkin, imitation Dacca muslin, carpets, both cotton and woollen, asnis, butter, glass-articles, glass-

bangles (churis), tinware, cheap cabinetware of Dinapur.

15. No facilities except what private enterprise would afford.

16. (a) There are local capitalists who make advances. I do not at present see the urgency of further advances.

(b) This is possible with respect to almost every industry.

(c) Special instruction is badly needed.

(d) Difficult to say.

17. { Carpet industry has decayed. May be revived
18. { by the supply of capital and introduction of
19. { new skill from Mirzapur. Vegetable dyeing
20. { cannot be revived in competition with the
cheap chemical dyes.

C.—MINERALS AND OTHER NATURAL PRODUCTS.

There are no mineral and natural products in the district.

D.—CAPITAL.

25. The manufacturers as distinct from the artisans make advances to the artisans.

26. No.

E.—TECHNICAL EDUCATION.

28. There is the Bihar School of Engineering at Bankipur, which teaches carpenter's and smith's work.

29. It is a Government School that teaches Survey, Engineering and Mechanics. The standard is almost the same as in the Sibpur School of Engineering.

30. Instruction is theoretical and practical.

31. Boys pass in increasing numbers each year, but they have not yet started any shop.

32. No.

34. Yes by the Scientific and Industrial Association.

35. They have some University qualification tested by the Committee of the Association.

36. Do.

37. Japan and other countries.

38. Nothing as yet.

39. Ambika Charan, B.A., has come out as an Electrical Engineer from Japan.

40. *Nil*.

41. He has recently come.

42. There is a branch of the Calcutta Industrial Association.

F.—INDUSTRIAL ASSOCIATIONS.

There is also the Bihar Industrial and Agricultural Exhibition Committee the object of which is to hold an Industrial and Agricultural Exhibition every year at Bankipur, to secure a full and improved representation of all the industries of Bihar. Exhibitions were twice held at Sonepur under the auspices of the Association. In 1907, the Exhibition was held at Bankipur. In February 1908, the Exhibition will be held again at Bankipur. The Agricultural Department of Government contributes Rs. 500 a year to the Exhibition and the Patna District Board Rs. 100. The Committee also subscribe to the Fund. The balance is supplied by the gate money and contributions from other District Boards.

14. RAO SAHEB DEORAO VINAYEK, *Akola (Berar)*.

1, 2, 3. I have not much to add to the information which Government reports and records contain. There are, I believe, all varieties of land in the Akola District, and nearly the whole of the culturable area is under the plough.

4. Barring the landholders, who are besides money-lenders, the condition of other landowning classes is not all that can be desired. They are fairly well off in years of plenty, but one drought throws many of them on the relief works or brings them face to face with starvation.

5, 6. I have no authentic information to supply except on clause (a) of question 6. As for clause (a).—Under the Co-operative Credit Societies Act, Societies have been established at some thirteen villages of this district. Besides these similar Societies were started by me at three other villages, years before the Act was applied to Berar. The object of all these is to raise funds by one method or another from among the members and to render them pecuniary help when it is needed. These Societies are, as it were, the places where, if so desired, the benefits of co-operation and mutual help can be learnt. The principle underlying them is not quite new to India, though the refined and methodical manner laid down by the Act is. It is as yet too early to pass an opinion on its success or otherwise. These Societies will, in all probability, stand in need of considerable pecuniary help from outside their members ;

and to meet this contingency the establishment of a Central Bank at Akola with a moderate capital is under contemplation. This project is in the sympathetic hands of our popular and energetic Officiating Deputy Commissioner Mr. Jather and has fair chances of success. The attempt described above would, however, be a mere drop in the ocean as it were, regard being had to the vast requirements of the district in general. But if the Government keep up its sympathy toward the movement as at present, and if the people in whose interest the attempt is made freely join the movement, the people will be practically benefited.

8—15. I cannot just now give precise answers to these questions. I may, however, say that there are many ginning and pressing factories in this district. The number of persons employed therein and the dependents on them may be approximately 50,000; but they have this employment only in the cotton season. There are three oil mills and one cotton spinning and weaving mill working all the year round, and the number of persons employed in them and of the dependents on these, may fairly be estimated at 1,000. One more spinning and weaving mill is under construction at Akola and may, when in full swing, find employment for another 1,000, probably throughout the year.

16. There are not big industries in the district except cotton weaving, which, too, is confined to the production of coarse cloth only. This admits of improvement no doubt, but before supplying money, power machinery, or new appliances, general education among the masses and special training besides to the artisan classes is needed urgently. My experience in the Akola Industrial Association, which will be related presently, bears out this view.

17—20. In times gone by there were in existence several private industries such as the manufacture of salt, paper, dyeing colours, opium, ganja, toddy, Sindi and Mhaura wines, cutlery, potteries, thikadi and other oils, bangles, etc. But they have all practically disappeared, some owing to foreign competition, some to Government monopoly, and others for want of funds, of mutual confidence, of a desire to help one another, of perseverance, of honest and efficient management. It is certainly practicable to revive some of them at least under present conditions. Spinning, weaving and oil mills worked by steam power will increase the quantity as well as improve the quality of the articles. Government are also trying to improve agriculture by introducing new methods and by starting a model farm at Akola. There are, besides, good prospects of reviving pottery, tanning, dyeing, bangle-making, Rosal oil and a few

other industries. The difficulties in the way are want of technically trained men, and of education among the masses, their ignorance of the real needs of the country and the means to supply them, apathy of the leaders, want of confidence in them on the part of the people, impatience of success, inexperience of business among those engaged in it and want of honesty and perseverance among managers. These defects are common among those who have lately been interesting themselves in matters industrial, though, of course, there are honourable exceptions. These are not all inherited defects. To this day millions worth of transactions are daily effected among men unknown to one another in the trading castes, and this is only possible by reason of the confidence they have in one another among themselves. Faith in one's neighbour is a necessary factor to ensure harmonious and successful working in joint business. And so is honest and efficient management. Radical changes are called for in the system of public instruction before the state of affairs we are talking of can be brought about. Want of money is not the only or the main obstacle in the way of successful industrial development. There is a great dearth of men who command respect alike for their attainments and their trustworthiness, and unless this can be remedied it is futile to hope for any great success.

21—24. I have no information. I may, however, state that an amount of raw material goes out of the country and comes again in the shape of finished articles. To this extent the country suffers a material loss every year.

25. The Bank of Bombay has a branch here and it supplies funds when sought for by business people.

26 and 27. Yes. One is in contemplation. See my answer to question 6 (a).

28 and 29. When the Berar Education Department introduced age limit rules in respect of students attending Government schools, about the year 1894-95, many good boys were cast adrift, and for their benefit I opened a technical class in the Native Cotton Ginning, Pressing and Spinning Co.'s Factory. The class is still going on. Good many boys have been and are being trained as fitters and turners and they have been earning enough to live respectably. Many were sent up for the Engineer's examination and about 25 passed in the examination of the Bombay Boilers Act. Of these, about 20 have been trained and sent up for the examination since the engagement of Mr. Govind V. Kolhatkar as engineer in my factory in 1907. Of these 25, about seven are second class and the rest third class engineers. Some of these are preparing for higher class certificates also. In addition to the above some

young men are under instruction in my factory in the spinning and weaving departments. There is also an industrial school conducted by Missionaries at Akola. The school is useful to the public and is well spoken of. It admits, I am told, only Missionaries.

30. The instruction given in the above class and school is only in the practice of the industry and principles are only taught so far as are absolutely required for sending out a thoroughly practical man into the world.

31. See answers to questions 23 and 29.

32 and 33. Not that I know of.

34 to 37. Yes. I have sent my cousin to Bombay to learn a branch of commercial education. He is an undergraduate. He is working in a respectable Indian firm dealing in cotton agency business.

38. He thinks of starting a business of his own here or in Bombay as circumstances permit.

39 and 40. There may be several whom I may not know. I know of only one person, Mr. Govind Vishnu Kolhatkar, whom I have engaged as my engineer. He is, besides being first class engineer of the Bombay Victoria Technical Institute, well up in spinning and dyeing, which were his special subjects. He is an all-round man and there are very few subjects as far as engineering, spinning and dyeing are concerned, of which he has not the requisite knowledge. There are good many qualified engineers and almost all of them are well employed.

41. As far as I know there is no necessity for doing anything.

42. Yes, there is one by name 'The Akola Industrial Association' established on the 20th April 1902 on the initiative and with the moral support of Kumar Sri Harbhamji Rawaji, the then Deputy Commissioner of Akola District. Its nominal capital is Rs. 1 lakh and the objects are as under :—(1) In the Akola District, to revive old industries that have decayed owing to want of encouragement. (2) To start and improve new industries. (3) To improve agriculture. (4) To improve the status of agriculturists. (5) To do every thing to promote the above objects, To accomplish the above objects—1. To collect useful information from India and outside. 2. To publish the same information by proper means for the people concerned. 3. To start scholarships and prizes and to give them to those deserving persons who receive instruction in any industry. 4. To find out markets for the products of the industries and agriculture. 5. To advance money to persons engaged in industry or agriculture

on moderate terms. 6. To advance loans on reasonable terms as to interest, and payments to associations or companies started on these lines. The Association was started for the Akola District but it was understood not to confine its effort to this district alone, and so directly it was started the Managing Board called a meeting and resolved, on the 21st April 1902, to use their first efforts towards improving the handloom weaving industry. A fly-shuttle loom of an improved kind and a man to work it were got down from Ahmedabad and it was set up and worked by the Akola Cotton Ginning, Pressing and Spinning Company. Samples of all cloths made in Berar were obtained. Berar weavers from all sides were invited and offered to learn to work the same. Many weavers were employed and taught the work, but only disappointment was in store for the Association. The weavers were in the end found to be so conservative that they would not, under any circumstances and conditions, exchange their old loom for the new. They would rather go on with their small incomes than earn more by substituting the improved for the old country loom. The Association was fortunate in getting any amount of assistance from the Company above named. The latter has erected a shed to accommodate 50 looms of the improved pattern with accessories so as to turn out 50 per cent. more cloth for the same cost and within the same time as the old looms. In fact, everything that this arrangement cost was found by the Company for the Association with the sole object of encouraging the weavers to use the new looms. The Company has thus to spend nearly Rs. 4,000 for the sake of the Association, and at least Rs. 1,500 out of this became a dead loss to it through the sheer indifference of the people for whose benefit it undertook the work. All this was, however, to no purpose, as the weavers refused to attach the fly-shuttle to their old looms, refused to work on the looms started by the Company on the piece-work system, refused all help from the Association in the shape of supply of material at a very small or no profit, of selling their goods which they could *not* sell in the market at *their* price to the Association for cost price, or in the shape of receiving advance of money required by them to go on with their work at a moderate rate of interest. and even refused to allow their boys to learn the fly shuttle working. The Association tried to change the attitude of the weavers through their own men and also through Kumar Shri Harbhamji Rawaji and other sympathetic high officers of Government, but all in vain. The experience of the Association is thus not very encouraging in this respect and it does not hope for better results in the near future. Success in this direction will only be possible when we shall have a new class

of weavers. For this general and technical education is wanted and Government assistance in the matter is indispensable. I am glad to think that it will be forthcoming at the hands of the local Administration. No doubt the experience of the Association is sad, but we should not allow it to dishearten us. I have lately added to my aforesaid Company a weaving shed and when this is in full swing I mean again to try to interest the weavers in shuttle looms. The cost of the preparatory work must be cheaper if ever we are to achieve success in this direction, I had, even when there were no power looms in my Company, prepared a warping machine to make a warp beam of 400 yards length and had made other arrangements also to wind cloth and unwind warps automatically. The preparatory work was thus made reasonably cheap. It can be made cheaper still, and the attempt is well worth making again.

The Memorandum and Articles of Association of the Association were framed and it was to be registered under the Indian Companies Act, but owing to the failure of the effort described above and other causes it had to be deferred. It is, in the meantime, intended to see what other industry the Association can take on hand. I have been inquiring what articles of every day use can be prepared and will command a market *in competition with imported ones*. I am in search of a man who will be able to prepare, among other things, candles, soaps, matches—sulphur and safety—,nibs, umbrellas and pencils. I had tried a Japan-returned Indian, who had professed to be able to refine cotton-seed oil which I had a mind to crush and send to market—local or foreign—for sale in *its refined condition*. The trial cost my Oil Mill Company a good deal, but proved unsuccessful owing, among other causes, to the incompetence of the man employed. The seed is in abundance in Berar, and if it can be profitably turned to use in the above manner it would repay the outlay. I have also tried another Japan-returned Indian who could prepare matches. A regular Company was started and large sums of money—rather more than Rs. 4,000—were spent in organising the business on a commercial basis, but the effort failed owing to several causes. I have a mind to try and put in practical shape some industry such as tanning, dyeing, or imitation ivory, and I am in search of a man competent to profitably work any of these three. The Association has above Rs. 5,000 in hand and can call in more if it can hope usefully and profitably to employ it.

The Indian Industrial Conference has been of late brought into being and the Akola Association has offered to act as its Berar Provincial Committee. The proposal is already before the Secretary, Rao Bahadur Mudholkar. In compliance with the request of the Provincial 'Industrial' Conference of the

Central Provinces and Berar, information in regard to present industries and means to improve them was sought for. About 100 letters were sent to the leaders in the province, of whom about 6 or 7 gentlemen sent answers and gave some information. This, of course, is not full, but as it is it will be placed before the next sitting of the Conference.

At Lonar there is an old lake producing different kinds of salt in abundance. The product is sold by Government for a term of years to private individuals by auction. A well-to-do Mahomedan gentleman from Mehkar, Khan Bahadur Khwaja Abdul Bakikhan, is the present lessee. He has got heaps of salt, amounting to thousands of tons in store. I had a mind to see if the product could be turned to more useful purposes than at present, and I was in communication with the gentleman and also with an English firm in Bombay through whom I got the salts analysed, and was going to find out what better use could be suggested. The attempt seems to have been found by the gentleman not quite hopeful and he does not think it worth his while to proceed further.

At Buldana there are smiths' families. Among them there are several good workmen. They can be utilised very usefully but good advice from me and from many other gentlemen including even Kumar Shri Harbhamji Rawaji and Mr. Rustomji, the present able and energetic Commissioner, was thrown on unwilling ears. They have got their own crooked ideas of their worth and value and would not adapt themselves to the changed conditions of the country. When my attempt to remove them from their old associations to Akola and help them in all possible ways here failed, I, while at Buldana in May last, arranged to start a company *there* at their very door and take them in either as shareholders or even as servants to make some sort of cutlery, but I failed there too.

On inquiry I found that in the province there are some public-spirited gentlemen wishing to do something to improve handloom weaving and I suggested to them to try to open classes to teach fly-shuttle weaving and have also promised to lend my loom and man to teach the work if such thing is practicable at any place.

Since the Association did not succeed in seeing any particular industry started or actually helped, it has now resolved to offer rewards every three months to persons preparing useful articles. For the present India-made umbrellas, pencils, nibs and holders are the articles advertised for rewards.

I had the honour of being introduced to the Hon'ble the Chief Commissioner and during the interview I tried to

explain the present condition of our industries. I requested him to have a thorough industrial survey made of the province and to open craft schools at different centres to teach different branches of industries.

Since the Akola Industrial Association has been established and as the improvement of agriculture is one of its objects, I handed over to it the supervision of the three agricultural societies I had started. They are now to all intents and purposes branches of the Association.

Most of this I have done and am doing on my own responsibility but on behalf of the Association and with a view to lay formally before the Association for action any of my attempts that might be attended with success. I am not yet disappointed but think that we must continue to work patiently and quietly wait for success.

(15) AJODHYA DAS, Esq., *Gorakhpur*.

[The information given below is about the Gorakhpur and Basti Districts.]

A.—AGRICULTURE.

1. Agriculture is the principal industry in these districts. It is conducted on old lines and the new scientific improvements have not been adopted as yet. The soil is fertile but it is losing its fertility on account of the increased pressure and the impoverished state of the tenants. Attempts have been made from time to time to introduce new staples, such as hemp, cotton and various kinds of rice but without success. Indigo was started about 1830 by European planters, and a better class of dye is produced here than in any other part of the United Provinces.

2. The average of the area brought under cultivation varies from 71·9 to 75 per cent.

3. The district of Gorakhpur is a submontane tract. Most of its soil is alluvial. The exact figures of the soil of this district are not available at this time.

As to the Basti District, the figures are as follows :—

<i>Nature of soil</i>	<i>Percentage.</i>
Loam or <i>Doras</i>	... 65 per cent.
Clay or <i>matiar</i>	... 27 "
Balna or sand	... 4 "
Kachhar	... the rest.

The above figures may also be taken for the Gorakhpur District with this modification, that there the proportion of Kachhar is greater.

4. The general condition of the landowning and cultivating classes is not at all satisfactory. The successive failure of crops has made them very poor. As a result of this the tenants cannot improve the condition of the soil which has been exhausted by constant tilling. The peasantry is mostly indebted to the Zamindar.

The petty Zamindars are also mostly in debt owing to their love of litigation.

5. In these districts there are no proprietary tenants. In Basti District 46·13 per cent. is held by tenants-at-will and 33·52 per cent. is held by proprietors as their *Sir* or *Khudkast* (*i. e.*, in their own cultivation), 24 per cent. by ex-proprietary tenants, 25 per cent. is rent free and 19·86 per cent. is held by occupancy tenants.

The exact figures for Gorakhpur are not yet available, but, broadly speaking, the proportion is much the same as in the sister district of Basti.

6. (a) Of late Agricultural Banks have been started where loan is given to agriculturists at the rate of 12 per cent. which is lower than the usual rate charged by the money-lenders. These Banks being very few in number are not within easy access of most of the tenants who have still to depend upon the money-lenders and pay an exorbitant rate of interest

(b) There is no school giving any such instruction.

(c) Very little. Chiefly confined to indigo planters who employ improved ploughs for tilling the soil, Tamkohi is a big estate in this district and it is under the Court of Wards. There they use harvesting machines for cutting and gathering crops.

(d) There are no scientific methods in vogue but agriculturists employ ordinary manure before sowing crops. There is considerable export of bones from these districts which tends to reduce the fertility of the manures.

7. This system has been introduced here quite recently and the few societies that have been formed are making progress. It has not been here long enough to produce any change towards the betterment of the tenantry.

B.—MANUFACTURING INDUSTRIES.

8—20. These districts are purely agricultural districts and manufactures in the proper sense of the word are non-existent and thus the manufactures such as they are, are merely designed for local requirements.

(1) The principal industry is cotton fabrics.

(2) Vegetable and animal products none,

(3) Horn and paper, none,

Leather, but only for local requirements.

Sabar or deer skin leather is cured and pillow cases and bed-sheets are made out of them and sold in the market.

- (4) Pottery, etc., calls for no special attention.
- (5) Metal—none of special interest. Metal vessels are made at Bakhira and Mehndawal in the Basti District, but the business is comparatively insignificant.
- (6) Chemical industries—none.
- (7) Furniture and decorations—none worth noting.
- (8) Materials used in construction, ordinary bricks and lime for local consumption.

In Gorakhpur the most considerable industry worth noting is the sugar refining which is carried on mostly on the old local methods prevailing in the district. In 1903 a large sugar refinery worked on European lines has been started. Manufacture of indigo is dwindling but still survives. The factories are owned and managed by Europeans. There is much room for improvement and expansion by using the methods enumerated in question 16. According to the last census in Basti—

- 56,500 persons were supported by textile industry.
- 32,500 by wood, cane and jungle products.
- 29,000 by metal work.
- 26,800 by earthenware and glass.

Another chief industry is textile fabrics. Here also there is great room for expansion. Want of capital is the cause of the decay of these industries. If advances be made to the Julahas and Konis I think they will be able to produce good fabrics.

For the present all these are only for local consumption with the exception of sugar which is sent to other places in some quantities.

Palanquins are made for local use.

C.—MINERALS AND OTHER NATURAL PRODUCTS.

21—24. In Basti and Gorakhpur *Kankar* of various kinds is to be found which is used as road metal as well as for making lime.

In Gorakhpur the chief mineral product is saltpetre which is extracted from saline efflorescence by *Lunias*.

D.—CAPITAL

25—27. There are two banks here over and above one District Bank started under the Co-operative Credit Societies Act ; but these afford no particular facilities for the support of industries.

E.—TECHNICAL EDUCATION.

28—41. None.

F.—INDUSTRIAL ASSOCIATIONS.

42. There is no Industrial Association.

APPENDIX V.

Report on the Work of the Berar Committee by Rao Saheb Deorao Vinayak, Akola.

Dated Akola, 28th November 1907.

To

THE GENERAL SECRETARY,

Indian Industrial Conference, Amraoti.

SIR,

As desired by Resolution No. 2, of the Provincial Industrial Conference of the Central Provinces and Berar, held at Raipur on the 31st March last, I have the honour to submit this report.

2. Directly the Conference was over I, on the 8th of April last, issued a circular letter to the leading men of Berar, including the members of the newly-appointed Berar Committee of the Conference to collect and send me information, among other things, about the old and new industries of the province and to suggest means to improve them. About 70 letters were sent but only six or seven gentlemen replied and gave some information. This, however, is not, as it naturally could not be, full and complete. Besides this, I have collected some more information to supply all of it to you; but since our Local Government has been pleased to specially appoint a high officer to make a regular and thorough Industrial Survey of the C. P. and Berar, the information so obtained and now in my possession would naturally be of very little use to you. I think, therefore, that I need not give it here. I may, however, state here that Berar does not at the present day boast of any industry worth the name besides handloom weaving. This weaving consists mostly of coarse cloth except at Kolhapur and Anjangaon-Surji and a few other places where silk weaving is also carried on to a small extent. But I do not think there is need of my sending information on handloom weaving which is carried on on antiquated lines. At some places fly-shuttle is being used or experimented upon and next year I may be able to say something about it.

3. As I promised in my letter of the 10th instant, I beg to inform you as to what I have done during the year.

(1) On behalf of the Akola Industrial Association I have advertised that I shall give prizes for articles of every-day use which are good. I shall declare the result of my examin-

ation of the articles of workmanship which have been received from Bombay and Poona on the 1st December.

(2) I have been in communication with a gentleman here who manufactures candles. The machinery he uses is all India-made and the article prepared is found as good as the Bombay one. He hopes to sell it in the market at the same prices as the Bombay candles fetch. If he succeeds in doing so the business will be started on a moderate scale.

(3) I have been examining a cotton-seed oil project and one for the manufacture of umbrellas. I have crushed cotton-seed and refined the crude oil. I have been now getting the sediment turned into soap, etc. I am also preparing the required articles except iron framing, to make a complete umbrella. When this is done and the articles are found worth taking to the market, I shall see if a business can be started on commercial lines. This examination is, however, in an experimental stage and I cannot say more at present.

I have the honour to be,

Sir,

Your most obedient servant,

DEORAO VINAYAK,

Secretary,

Berar Committee of the Indian Industrial Conference.

APPENDIX VI.

Communication to the Provincial Committees.

From

RAO BAHADUR R. N. MUDHOLKAR,
*General Secretary,
Indian Industrial Conference.*

To

- (1) P. ROY CHAUDHURI, ESQ.,
*Secretary (in charge), Bengal Provincial Committee of the Indian Industrial Conference,
Calcutta.*
- (2) LALUBHAI SAMALDAS, ESQ.,
*Secretary, Bombay Provincial Committee of the
Indian Industrial Conference, Bombay.*
- (3) THE SECRETARIES,
*The National Fund and Industrial Association,
Madras.*
- (4) THE SECRETARIES,
*The United Provinces Industrial Association,
Allahabad.*
- (5) LALA MULKRAJ,
*Secretary, The Punjab Committee of the Indian
Industrial Conference, Lahore.*
- (6) KRISHNA RAO DESHMUKH, ESQ.,
*Secretary, The Central Provinces Industrial
Committee, Nagpur.*
- (7) RAO SAHEB DEORAO VINAYAK,
Secretary, The Berar Industrial Committee, Akola.

SIR,

The Provincial Committees of the Indian Industrial Conference were established by Resolution VI of the First Conference held at Benares in December 1905, "for giving effect to the recommendations (of the Conference), generally encouraging industries and making an industrial survey in their several provinces, and compiling useful facts and sugges-

tions for submission to the next Industrial Conference in December 1906. In order to carry out these views each Committee is requested to raise suitable funds, appoint trustees, frame rules for the conduct of business and lay its accounts before the next Industrial Conference."

By Resolution V of the Second Indian Industrial Conference, the Committees were "asked, besides taking steps to promote industries in their several provinces, to compile useful facts and suggestions for submission to the next Industrial Conference, and to raise suitable funds for carrying on their work." I am to request you to send a report of the work done by your Committee in the present year in accordance with the foregoing Resolutions.

2. In accordance with Resolution VI of the last Conference, an Additional Assistant Secretary was to be appointed, "so that the Assistant Secretary may be free to visit the different provinces and help the Provincial Committees in all matters in which they may require assistance." And the Conference voted "a sum of Rs. 10,000 for meeting the expenses of the next twelve months and also for issuing a quarterly bulletin of industrial information under suitable management." In point of fact, less than half of this sum has been realised and it has not been possible, for want of adequate funds, either to appoint an Additional Assistant Secretary or to issue the bulletin. It is, however, essential that both of these things should be done. As our first President, Mr. R. C. Dutt, observed in his speech at the last Conference, one Assistant Secretary is required to visit the different provinces and help in the work which devolves on the Provincial Committees and to secure "a greater degree, of co-operation between the Central Office and the Provincial Committees." The need of a bulletin, too, is great in the present circumstances of, and with the welcome awakening to the need of industrial development that we witness in the country. How to get the requisite funds is then the question. I hope that your Committee will give their attention to this important matter.

3. This leads me to the question of the future organisation and work of the Conference. I have been asked to communicate, for the opinion of the Provincial Committees, the papers received from Kumar Sri Harbhamji Rawaji of Rajkot and Mr. A. C. Sen of Calcutta on this question, and I send them herewith. It is true that if the Conference is to carry out its object effectually there must be regular, methodical work all through the year based on definite principles and carried on settled lines. At the same time no very elaborate and ambitious scheme stands much chance of success at this time. I have accordingly drawn up what I believe to be a few simple and workable rules which I send herewith, I request

you will be so good as to place all these three papers before your Committee and favour me with their opinion on them.

4. In regard to the carrying out of an industrial survey, I framed last year a set of questions with the object of facilitating the collection of the needed information and sent out nearly a thousand copies, but the response was most meagre and disappointing. I have, therefore, issued them again this year in the hope that some attention would be paid to so important a matter. I send a copy (with four spare copies) of the questions herewith and request you to obtain answers from qualified persons in your province. All replies received before the 20th November will be printed along with the annual report which we shall present to the next session of the Conference, following the precedent of last year.

5. A suggestion that has been repeatedly made is that translations should be made of the most important papers laid before the Conference and the vernacular renderings distributed largely. This is a means of disseminating valuable information which deserves to be adopted by the Provincial Committees. Regard being had to the number of languages into which translation will have to be made, it is obvious that the work cannot be undertaken by the Central Office. It falls within the sphere of the Provincial Committees and their earnest attention to this matter is solicited.

6. Sir Guilford L. Molesworth, an eminent retired Anglo-Indian who takes an abiding interest in the industrial movement and who contributed able papers to the Benares and Calcutta Conferences, asks the Conference to adopt the proposition quoted below :—

“ That this Conference urges on the Government of India :— (1) To inaugurate a carefully considered policy of moderate import duties, which will not only yield a revenue that will relieve the land of the dead weight of taxation, but will also protect the industries of India from unfair and unrestricted foreign competition. (2) To foster International and Inter-Colonial trade by the exchange of mutual concessions and preferential treatment with the Colonies and Great Britain.”

Please let me know whether it is the wish of your Committee that the subject of fiscal policy should be taken up by the Conference, and, if so, in what form a proposition should be placed before it.

7. It remains to request you to let me have the benefit of any suggestions your Committee may deem fit to make in regard to the next session of the Conference :—

(i) Who should be invited to fill the office of President ;
 (ii) On what subjects papers should be called for and from whom ;

(iii) What propositions should be placed before the Conference and who should be asked to speak to them,

(iv) Whether there should be a handloom competition as there was last year, and if your answer be in the affirmative, what amount your Committee will contribute for awarding prizes;

(v) Any other suggestions.

I request you to convene a meeting of your Committee as soon as possible after receipt of this and communicate their opinions to me not later than the 8th of November.

I have the honour to be,

Sir,

Your most obedient servant,

R. N. MUDHOLKAR,

*General Secretary,
Indian Industrial Conference.*

APPENDIX VII.

Technical Department of the Bengal National College.

The work of the Technical Department divides itself into two branches, and in both, the Physical and the Chemical Departments act in co-operation with the Technical.

First, from the lowest classes of the school upwards through the Primary and Secondary Courses (excepting only in the case of the Intermediate class students offering the alternative literary course) a graduated course of technical instruction is given to our boys according to a scheme framed by Mr. Ranade, which was adopted by the Council at its last meeting. This technical instruction is given along with elementary instruction in Experimental Chemistry and Physics and also Botany and Physiology. What has already been referred to as the *mixed course* for the primary and secondary classes of the school is this combination of elementary, technical and scientific training with literary instruction. The teaching of *Drawing* is also necessarily compulsory in the mixed course. Up to the Fifth or Matriculation standard of the school the mixed course is compulsory ; and it is only in the Intermediate or the Sixth and Seventh standard course that students are given the option of taking up either the Literary or the Scientific and Technical Course. It is necessary to note, however, that the Literary Course boys (Intermediate) are given also the option of studying any one or more of the Commercial subjects prescribed for the Commercial Department of our Institution. .

Besides the mixed course of studies for students of the primary and secondary classes, there are the students of the Technical Department proper. Candidates for admission into that Department are required to produce a certificate of having passed the Fifth Standard Examination of the National Council or any equivalent examination. The Technical Department students will receive in the General Department of the College a general scientific course of education in Physics, Chemistry, Mathematics and Drawing ; and in the Technical Department a special course of instruction in the following subjects :—

Machine Drawing ; Mechanics ; Steam Engines and Boilers ; Hand and Machine Tools ; Pattern-making ; Brass Moulding ; Smithy ; Turning ; and Fitting.

Besides receiving a scientific education in principles our students will be specially trained to apply the principles in practice so as to be able to take up the smaller industries not requiring the investment of large capital. Thus in the workshops attached to the Physical, Chemical and Technical Departments, the students will be taught and required to manufacture, as far as practicable, their own instruments and apparatus. It is proposed for the present to teach our students to manufacture articles under the following heads :—

I. CARD-BOARD AND PAPER-WORK.

- (a) Medicine cases.
- (b) Stationery boxes.
- (c) Other assorted boxes.
- (d) Envelope cases.
- (e) Portfolios.
- (f) Blotting pads.
- (g) Geometrical models.
- (h) Envelopes, letter-paper, postcards, &c., &c.

II. WICKER-WORK.

- (a) Arm chairs.
- (b) Waste-paper baskets.
- (c) Boxes.
- (d) Travelling bags.
- (e) Tea poys, etc., etc.

III. CLAY-MOULDING.

Clay figures.

IV. WOOD-WORK.

- (a) Candle sticks.
- (b) Picture frames.
- (c) Toys.
- (d) Handles, pen-holders and stationery cases.
- (e) Artistic furniture (fret work).
- (f) Wood-carving.
- (g) Instrument boxes.
- (h) Stands, tables, supports, lifts and other fittings and appliances for chemical and physical laboratories.
- (i) Drawing boards.
- (j) Set-squares.
- (k) T-squares.
- (l) Parallel rulers.
- (m) Geometrical drawing models.
- (n) Measuring scales.
- (o) Models of verniers.

(p) Kindergarten materials for children in elementary schools.

(q) Machine and engineering models (wheels, pulleys, inclined planes, screws, toy engines, culverts, bridges, etc, etc.)

V. METAL-WORK.

Scientific instruments and apparatus for physical and chemical laboratories.

VI. METAL-WORK.

Garden tools and agricultural implements.

VII. METAL-WORK.

Cutlery.

VIII. METAL-WORK.

Small hand-presses, pumps, pulley-blocks, screw-vices, etc.

IX. METAL-WORK.

Sheet-metal goods.

- (a) Locks and keys.
- (b) Trunks.
- (c) Candle sticks.
- (d) Water buckets.
- (e) Office boxes.
- (f) Canisters.
- (g) Varnish and oil cans.
- (h) Butter tins, etc., etc., etc.

X. METAL-WORK.

Grinding and polishing.

XI. GLASS-BLOWING.

Glass apparatus used in chemical laboratories.

APPENDIX VIII.

JOINT STOCK COMPANIES.

*Number and Particulars of Joint Stock Companies registered in each Province in British India
in the twelve months ending the 30th September 1907.**

No.	Name of Company and Situation of its Registered Office.	Object.	Capital.
	I.—BANKING AND INSURANCE.		Rs.
	(a) BANKING AND LOAN.		
1	Industrial Bank of India, Ludhiana, Punjab	Banking and Commission Agency	5,00,000
2	Madura Sri Ashta Lakshmi Sahaya Nidhi, Madura, Madras	Money-lending (mutual)	1,89,000
3	Idigrai Devalaya Paripalana Nidhi, Coimbatore, Madras	Do	1,00,000
4	Indian Specie Bank, Bombay	Banking	1,00,000
5	Madura Union Ela Chit Co., Madura, Madras	Money-lending (mutual)	2,00,00,000
6	Lyallpur Bank, Lyallpur, Punjab	Banking	1,50,000
7	Woriar Alliance Bank, Trichinopoly, Madras	Do	1,00,000
8	Agricultural and Commercial Bank, Tinnevely, Madras	Do	1,49,985
9	Superior Bank, Muzaffarnagar, United Provinces	Do	2,00,000
10	Bank of Multan, Multan, Punjab	Do	20,000
11	Indian Bank, Madras	Do	2,00,000
12	Trichinopoly National Bank, Trichinopoly, Madras	Do	20,00,000
13	Madura Sarvajana Upakara Sahaya Nidhi, Madura, Madras	Money-lending	1,00,000
14	Orient Bank of India, Lahore, Punjab	Banking Business	4,20,840
15	Shanmuga Sahaya Nidhi, Madura, Madras	Money-lending	5,00,000
16	Gaya Bank and Trades Association, Gaya, Bengal	Banking and Loan Business	3,36,000
			50,000

17	Shri Venkatesh Bank, Hubli, Bombay ...	...	Banking Business ...	...	29,970
18	Bengal National Bank, Calcutta ...	...	Banking and Loan ...	...	50,10,000
19	Malvalli Kasaba Sri Lakshminarasingswami Bank, Fort, Malvath, Mysore.	...	Banking ...	...	30,000
			Total, Banking	...	3,00,75,795
(b) INSURANCE.					
20	National Indian Life Insurance Co., Calcutta ...	...	Business of Life and other Assurances	...	10,00,000
21	National Insurance Co., Calcutta ...	...	Business of an Insurance Company	...	10,00,000
22	National Insurance and Banking Co., Amritsar, Punjab	...	Life Insurance	...	10,00,000
23	Aswini Government Security Life Assurance Co., Vizagapatam, Madras.	...	Lo	...	1,00,000
24	Hindustan Co-operative Insurance Society, Calcutta	...	Insurance Business...	...	1,00,00,000
25	General Assurance Society, Ajmer ...	...	Insurance	...	1,00,000
26	Indian Mercantile Insurance Co., Bombay	...	Fire Insurance	...	50,00,000
			Total, Insurance	...	1,82,00,000
			Total, Banking and Insurance ..	...	4,82,75,795
II.—TRADING.					
(a) NAVIGATION.					
27	Swadeshi Steam Navigation Co., Tinnevely, Madras	...	Navigation	...	10,00,000
			Total, Navigation...	...	10,00,000
(b) OTHERS.					
28	Assam Combination Trading Co., Dibrugarh, Eastern Bengal and Assam.	...	Trade contract	...	5,000
29	Sonanganj Lakshmi Bhandar, Sylhet, Eastern Bengal and Assam.	...	Agriculture, Trade and Banking	...	20,000

No.	Name of Company and Situation of its Registered Office.	Object.	Rs.	Capital.
II.—TRADING—(Continued).				
(b) OTHERS—(Continued).				
30	National Spinning and Weaving Co., Calcutta	Spinning and Weaving Industry	20,000	20,000
31	Friends' Trading Co., Gorakhpur, United Provinces	General Trade	20,000	20,000
32	Etawah Fibre Trading Co., Etawah, do.	Trade in Fibre	1,50,000	1,50,000
33	Kalidaikurchi Sudesa Tolil Pandasalai, Tinnevely, Madras	Trading in Swadeshi articles	20,000	20,000
34	Swadesa Paddartha Sangraha, Dharwar, Bombay	Trading in country goods	20,000	20,000
35	Mysore Raj Tobacco Manufacturing Co., Bangalore, Mysore	Curing and flavouring tobacco and Manufacturing cigarettes	15,000	15,000
36	Indian Stores Company, Karachi, Sind	Trading in Co-operative Stores	25,000	25,000
37	Tripura Jatiya Bhandar Co., Comilla, Eastern Bengal and Assam	Trading	30,000	30,000
38	Borsad Swadeshi Sahayak Mandal, Borsad Bazaar, Bombay	Trading in country-made goods	5,000	5,000
39	Agriculturists' and Artisans' Alliance, Madras	General Trading	1,00,000	1,00,000
40	All-India National Industrial Co., Ganjam, Madras	General trading	10,000	10,000
41	Surma Valley Weaving and Trading Co., Sylhet, Eastern Bengal and Assam.	Trading in Swadeshi Goods	20,000	20,000
42	Dacca Silpa Samiti, Dacca, Eastern Bengal and Assam	Trading	20,000	20,000
43	Bharat Bhandar, Mirzapur, United Provinces	Encouraging and extending production and consumption of Indian articles	25,000	25,000
44	Decan Match Manufacturing Co., Karad, Bombay	Manufacturing Matches	1,00,000	1,00,000
45	United Swadeshi Trading Co., Bombay	General trading	50,000	50,000
46	Indian Cement Syndicate, Bombay	Manufacturing and selling cement	30,000	30,000
47	Nadiad Silk, Woollen and Cotton Handloom Weaving Co., Nadiad, Bombay.	Trading and manufacturing cloth, yarn, etc.	50,000	50,000
48	People's Swadeshi Stores Co., Hyderabad, Sind	Trading in Indian articles	20,000	20,000
49	Narasapur Industrial Improvement Co., Kistna, Madras	Selling country-made goods	50,000	50,000
50	Nowgong Trading Co., Nowgong, Eastern Bengal and Assam.	Trading	20,000	20,000

51	Jalpaiguri Silpa Samiti, Jalpaiguri, Eastern Bengal and Assam.	Trading	...	...	...	50,000.
52	Darbhanga Trading Co., Darbhanga, Bengal	General trading	...	...	...	20,000.
53	Pursuarthi Co., Ajmer	Manufacturing and dealing in articles	...	...	Swadeshi	1,00,000
54	Jogatekar & Co., Akola, Berar	Manufacturing soap, candles and fumery	...	...	...	1,00,000
55	Indian Soap and Candle Factory, Bombay	General trading	...	...	...	3,00,000.
56	Swadeshi Hosiery and Manufacturing Co., Bombay	Trade and Commerce	...	...	...	50,000
57	Kamrup Industrial and Trading Co., Gauhati, Eastern Bengal and Assam.	Trading in Salt	...	...	...	80,000
58	Covelong Salt Co., Chingleput, Madras...	Trade and Commerce	...	...	...	1,00,000
59	Dinaipur Trading and Banking Co., Dinaipur, Eastern Bengal and Assam.	Trade in Indian manufacture and produce...	...	...	...	10,000
60	Kotechandpur Swadeshi Bhandar Company, Bengal	Trade in Indian articles	...	...	...	20,000
61	Malegaon Swadeshi Co-operative Trading Co., Malegaon, Bombay.	Manufacturing matches	...	...	...	30,000
62	Belgaum Match Manufacturing Co., Belgaum, Bombay	Weaving Industries	...	...	...	20,000
63	Negapatam Weaving Co., Negapatam, Madras	Co-operative Stores	...	...	...	20,000
64	Tanjore National Co-operative Emporium, Tanjore, Madras	Small Industries	...	...	...	4,00,000
65	Small Industries Development Company, Bengal	Trade in country-made articles	...	...	...	10,000
66	Desbi Stores Company, Shikarpur, Bombay	Chrome tanneries	...	...	...	20,000
67	Coimbatore Industries, Coimbatore, Madras	Trade and Commerce	...	...	...	20,000
68	Kansat Trading Co., Malda, Bengal	Hosiery business	...	...	...	2,00,000
69	Bengal Hosiery Co., Bengal	General trade	...	...	...	20,000
70	Hit Karni Co., Agra, United Provinces...	Do	...	...	...	2,00,000
71	J. Roy Co., Multan, Punjab	Do	...	...	...	1,00,000.
72	Punjab Commercial House, Amritsar, Punjab	Commission Agency	...	...	...	4,000
73	Shah Brothers & Co., Bombay	Chemical Works	...	...	...	5,00,000.
74	Alembic Chemical Works, Bombay	Tanning and Manufacturing	...	...	Leather	5,00,000
75	Agra Boot and Equipment Factory, Agra, United Provinces	General trade	...	...	...	20,000.
76	Shri Ambica Merchant Co., Ahmedabad, Bombay	Trade in Indian articles	...	...	...	20,000
77	Satara Swadeshi Commercial Co., Satara, do	General trade	...	...	...	20,000
78	Cuddalore Swadeshi Mercantile Co., Cuddalore, Madras	General trade	...	...	...	20,000

No.	Name of Company and Situation of its Registered Office.	Object.	Capital.
	Rs.		
II.—TRADING—(Continued).			
(b) OTHERS—(Continued).			
79	South Indian Agricultural and Industrial Improvement Co., Anakapalle, Madras.	General Trade and Commission Agency ...	1,00,000
80	Rangpur Tobacco Co., Rangpur, Eastern Bengal and Assam ...	Manufacturing cigarettes, cigars, snuffs and other products of tobacco ...	1,00,000
81	Ananda Bhandar, do do ...	Trading and Banking ...	20,000
82	Property Dealing Co., Lahore, Punjab ..	Dealing in immovable property ...	1,00,000
83	Swadeshi Lala Co., Ahmedabad, Bombay ..	Trading in handlooms ...	1,00,000
84	Bombay Milk Supply Co., Ahmedabad, Bombay ..	Trading in milk, butter, etc. ...	20,000
85	Saidapet Industrial Co., Chingleput, Madras ..	Encouragement of industries and trade ...	10,000
		Total, Others ..	41,79,000
		Total, Trading ..	51,73,000
III.—MILLS AND PRESSES.			
(a) COTTON MILLS.			
86	Swadeshi Weaving Co., Amritsar, Punjab ..	Working and manufacturing cotton, etc. ...	50,000
87	Kalishwar Mills Co., Coimbatore, Madras ..	Spinning and weaving cotton ...	9,00,000
88	Maharana Bhowsingji Mills Co., Bombay ..	Spinning and weaving cotton, etc. ...	10,00,000
89	Ahmedabad Sri Ramkrishna Mills Co., Ahmedabad, Bombay ...	Do ..	3,25,000
90	Swadeshi Industrial Spinning and Weaving Co., Vizagapatnam, Madras.	Do ..	1,00,000

91	Broach Industrial Cotton Spinning and Weaving Co., Broach, Bombay.	Manufacturing and Spinning cloth	...	7,00,000
92	H. H. The Maharana Shri Ajitsinghjee Dharangadra Mills Co., Bombay.	Do	...	5,00,000
93	Kamakshi Mills Co., Tanjore, Madras	Spinning and weaving	...	10,00,000
94	Jam Shri Ranjit Shinjee Spinning and Weaving Co., Bombay.	Spinning and weaving cotton, etc.	...	8,00,000
95	Sir Rasulkhan Mills Co., Bombay	Do	...	10,00,000
96	Guntur Hosiery Mills Co., Guntur, Madras	Do	...	50,000
Total, Cotton Mills...				64,25,000
(b) OTHER MILLS AND PRESSES.				
97	Trading Vaishya Ginning and Cotton Press Mills Co., Agra, United Provinces.	Trade in Ginning Cotton, etc.	...	1,00,000
98	Swadeshi Manufacturing Rice and Oil Mills and Trading Co., Ganjam, Madras.	Milling rice, etc.	...	5,850
99	Barisal National Oil Mills Co., Nalchitti, Eastern Bengal and Assam.	Trading, etc.	...	75,000
100	Nimar Cotton Co., Bombay	Ginning and Pressing Cotton, etc.	...	2,00,000
101	Malwa Cotton Co., Bombay	Do	...	1,50,000
102	Mahadeva Cotton Press Co., Bombay	Do	...	60,000
103	Cocanada Jute Press Co., Godavari, Madras	Do	...	1,50,000
104	Bhagwati Flour and General Mills Co., Ambala, Punjab	Wheat and Grain Millers	...	15,000
105	Madanganj Pressing Co., Bengal	Pressing jute, cotton and hides	...	1,50,000
106	United Ginning and Pressing Co., Bombay	Ginning and pressing cotton, etc.	...	10,00,000
107	Swadeshi Calico Printing Co., Bombay	Bleaching, dyeing, etc.	...	5,00,000
108	Babrala Cotton Ginning Press Co., Barhala, United Provinces.	Manufacturing cotton, wool, etc.	...	1,00,000
109	Barla Zaveri Ginning and Manufacturing Co., Ahmedabad, Bombay.	Ginning and pressing cotton, etc.	...	20,000
110	Anakapalle Commercial Syndicate, Anakapalle, Vizagapatam, Madras.	Milling rice	...	50,000
111	Karnatic Weaving Establishment, Bangalore	Weaving with improved handlooms	...	50,000

No.	Name of Company and Situation of its Registered Office.	Object.	Capital.
	III.—MILLS AND PRESSES—(Continued).		Rs.
	(b) OTHER MILLS AND PRESSES—(Continued).		
112	Jumna Flour Mills Co., Cawnpore, United Provinces	Flour manufacture ...	3,00,000
113	Hari Shunkar Busdeo Cotton Press and Ginning Mills Co., Debai, United Provinces.	Manufacturing jute, cotton, etc.	96,000
114	Jhotana Ginning Co., Ahmedabad, Bombay	Ginning and pressing	36,000
115	Sri Lakshmi Rice Mills Co., Guntur, Madras	Milling rice	20,000
116	Vizag Mills Co., Vizagapatam, Madras	Do	5,00,000
117	Century Flour Mills, Lahore, Punjab	Milling flour	5,00,000
118	Karachi Steam Roller Flour Mills, Karachi, Sind	Do	4,00,000
119	Bharat Press Co., Bombay	Ginning and Pressing cotton, etc.	2,50,000
120	Sri Tripura Sundari Cotton Press, Bezvada, Madras	Do	85,000
121	Zayathree Rice Mills Co., Sagaing, Burma	Rice-milling	50,000
122	National Trading Co., Rangoon, Burma	Oil-milling	1,00,000
		Total, Other Mills and Presses...	49,62,850
		Total, Mills and Presses...	1,13,87,850
123	Hadi Sugar Manufacture Works, Meerut, United Provinces	Manufacture of sugar	1,00,000
124	Union Indian Sugar Mills Co., Cawnpore, United Provinces	Do	4,00,000
		Total, Sugar Manufacture...	5,00,000
	IV.—SUGAR MANUFACTURE.		

V.—PLANTING, MINING AND QUARRYING.

125	Kuardi Coal Co., Bengal	...	...	Business of mining and dealing in coal and coke.	3,00,000
126	East Kuardi Coal Co., Bengal	...	...	Do	2,60,000
127	Huntodih Coal Co., Bengal	...	...	Do	2,00,000
128	Bengal Bhatdee Coal Co., Bengal	...	...	Do	4,50,000
129	Trichinopoly Treasure Trove Co., Nilgiris, Madras	...	...	Mining, etc.	30,000
130	Hajee Prospecting Syndicate, Mysore	...	...	Mining all sorts of minerals	1,00,000
131	Bengal Agricultural and Dairy Farm, Bengal	...	...	Cultivation of cotton, jute, rice, etc.	5,00,000
132	Southern India Manganese Company, Madras	...	...	Working manganese, etc.	2,00,000
133	Indian Granite Company, Madras	...	...	Mining stones	1,00,000
134	Mysore Fruit Syndicate, Bangalore	...	...	Fruit cultivation	3,00,000
135	Tata Iron and Steel Co., Bombay	...	...	Mining iron ore, etc.	2,31,75,000
136	Banganapalle Minerals Syndicate, Madras	...	...	Gold-mining	99,990
				Total, Planting, Mining and Quarrying...	2,57,54,990

VI.—OTHERS.

137	Guntur District Athmakuru Lift Irrigation Co, Guntur, Madras.	...	...	Construction of irrigation channels for watering fields from the Kistna canal.	12,200
138	Belgaon Company, Chittagong, Eastern Bengal and Assam	...	...	Acquisition of Belgaon Estate, etc.	50,000
139	Punjab Building Co., Lahore, Punjab	...	...	Buying and selling of lands, building, etc.	2,50,000
				Total, Others ..	3,12,200
				Grand Total...	9,14,09,835

*Abstract Table of Companies Registered in the Twelve Months ending 30th September 1907.
Compared with the Number Registered in the Nine Months ending 30th September 1906.*

Description.	Numbers.		Capital.	
	Jan.—Sep. 1906.	Oct. 1906— Sep. 1907.	Jan.—Sept. 1906.	Oct. 1906.— Sep. 1907.
Banking Companies ...	14	19	Rs. 1,67,00,000	Rs. 3,00,75,795
Insurance Companies ...	3	7	55,20,000	1,82,00,000
Navigation Companies ...	5	1	1,21,00,000	10,00,000
Other Trading Companies ...	46	58	70,53,200	41,79,000
Cotton Mills ...	22	11	1,80,52,000	64,25,000
Other Mills and Presses ...	16	26	47,86,750	49,62,850
Sugar Manufacturing Companies ...	2	2	5,00,000	5,00,000
Planting, Mining and Quarrying Companies ...	4	12	4,62,000	2,57,54,990
Other Companies ...	2	3	5,50,000	3,12,200
Total ...	114	139	6,57,23,950	9,14,09,835

APPENDIX IX.

(Re-printed from the " Indian Trade Journal " of
date June 27, 1907.)

INDIAN JOINT STOCK COMPANIES.

A YEAR'S PROGRESS.

The total number of Joint Stock Companies registered in India in the course of 1906-07 under the Indian Companies Act VI of 1882 amounts to 308 with a nominal capital of Rs. 11,80,33,075, compared with 277 companies with Rs. 7,93,51,568 in 1905-06 and 143 companies with Rs. 3,70,31,779 in 1904-05. There has, therefore, been a continuous growth in the number of companies in each successive year and in the average amount of nominal capital per company. This was Rs. 2.59 lakhs in 1904-05, Rs. 2.86 lakhs in 1905-06 and Rs. 3.88 lakhs in 1906-07.

On the other hand, it is necessary to examine the variations in the ratio borne by the paid up to the nominal capital at time of registration. The figures for the last three years as far as reported were :—

CAPITAL—R.

No.	CAPITAL—R.		Ratio of Paid-up to Nominal.
	Nominal	Paid-up.	
1904-05—143	3,70,31,779	36,88,379	10 per cent.
1905-06—277	7,93,51,568	19,28,118	2.4 "
Increase 93.7 p. c.	114.3 p. c.	—47.7 p. c.	
1906-07—308	11,80,33,075	1,96,702	2 "
Increase 11.2 p. c.	48.7 p. c.	—89.8 p. c.	

The figures of paid-up capital which are shown above represent in each case the sums actually paid up at time of registration. They do not necessarily afford any gauge of the prospects of the companies, but it is a fact that the market was inimical to the raising of capital and the contrast (which is a real one) between the respective centesimal ratios of paid-up to nominal capital has a certain interest.

	No.	1905-06.		No.	1906-07.	
		Nominal—Rs.	Paid-up—Rs.		Nominal—Rs.	Paid-up—Rs.
Banking and Loan ..	45	68,33,748	25,618	55	4,20,60,505	43,766
Insurance ..	55	6,15,830	...	51	88,71,270	525
Navigation ..	2	16,00,000	...	5	1,25,00,000	...
Printing ..	5	4,45,000	6,050	8	15,00,000	...
Trading ..	77	1,03,79,000	8,30,000	96	1,09,85,700	11,971
Cotton Mills ..	27	1,58,50,000	3,89,600	18	1,60,07,000	80,460
Jute Mills ..	3	50,00,000	...	2	41,00,000	...
Cotton and Jute Screws and Presses ..	7	4,35,000	62,500	13	20,40,000	...
Coal Mining ..	7	18,70,000	60,000	21	94,25,000	...
Land and Building ..	2	14,00,000	...	6	37,70,000	...
Sugar ..	3	18,50,000	4,99,650	3	10,00,000	...

Of the new nominal capital Rs. 5,09,40,775 or about 43 per cent. was intended for Banking, Loan and Insurance Companies, 74 per cent. of this amount relates to companies registered in Bombay and 118 per cent. in Madras. Trading companies account for 21.6 per cent. (Rs. 2,55,35,700,) of which Rs. 1,25,00,000 or nearly half was to be invested in Navigation.

DIVISION OF CAPITAL.

Nearly 20 per cent. (about Rs. 2,35,89,600) of the aggregate capital was to be devoted to mills and presses, chiefly for working and pressing cotton, jute, wool and silk. A number of the mills and presses are registered in Bengal (nine with capital of Rs. 80,55,000); Bombay (fifteen with Rs. 90,70,000), and Madras (seven with Rs. 45,67,850). The new capital proposed in respect of mining and quarrying companies is Rs. 1,10,65,000, of which 85 per cent. was to be invested in coal companies registered in Bengal. The increase has been four-fold compared with the capital invested in coal companies during 1905-06.

About 73 per cent. of the total nominal capital invested in Joint Stock Companies during 1906-07 is concentrated in companies registered in Bengal and Bombay. Bengal had Rs. 2,85,37,500, being 24 per cent. and Bombay Rs. 5,81,08,100 or 49 per cent. Thereafter, but a long way behind comes Madras with a projected addition to joint stock capital of Rs. 1,33,80,625 or 11.3 per cent. of the whole.

The average capital of each company is Rs. 3,83,224 against Rs. 2,86,467 in 1905-06, the provincial averages being Rs. 10,76,077 for Bombay, Rs. 3,90,925 for Bengal, Rs. 1,21,642 for Madras. The average for Bombay is considerably higher this year owing to the registration of seven important companies, namely :—

				Rs.
Indian Specie Bank	...	...	...	2,00,00,000
Bank of India	...	...	...	1,00,00,000
Bombay Steam Navigation Co.	...	...	...	60,00,000
All-India Insurance Co.	...	...	...	50,00,000
Shah Steam Navigation Co. of India	...	...	...	30,00,000
Bank of Western India	...	...	...	25,00,000
Finlay Cotton Mills	...	...	...	20,00,000

The average for Madras is as usual lower on account of the extended application of the Companies Act to the business of small money-lenders, for no less than 84 Loan and Insurance Companies with a nominal capital of Rs. 60,40,775 were registered during the year in Madras, out of a total of 106 companies with Rs. 5,09,40,775 for All India.

APPENDIX X.
INDIAN PATENTS.

(*Filed in the Twelve Months October 1906—September 1907.*) *

APPLICATIONS FILED.

1. J. N. Dey, of Howrah, for a self-adjustable easy chair.
2. Sreemanthula Kuppachary, of Madras, for an improved water-lift.
3. Rai Bahadur B. B. Chakravarti, of Benares, for improved lock-tile called 'Chakravarti' tile.
4. Tulsidos Khemchand Sipahimalani, of Quetta, for a pain balm.
5. Akbar Ali, of Ludhiana, for a loom with a single shaft for shedding, picking and beating up.
6. Surendra Nath Mukerji, of Calcutta, for Mukerji's patent sound doubling adjustment for attachment to sound boxes of disc talking machines.
7. Jawahar Singh, of Jawalapur, for an improvement in wheel and axle
8. P. S. Mudaliar, of Palamedu, for a water-lifting machine.
9. Rama Dayal Fuller, of Aligarh, for improvements in oil lamps.
10. Chunder Nath Bose, of Bally, for a process of colouring celluloid and the like.
11. Abdul Rajak Abdul Rahim, of Surat, for a musical instrument called the bell instrument.
12. Lalit Chandra, of Gauhati, for improvements in lamps.
13. Cankala Kristnasawmy Veerasawmy Naidu, of Negapatam, for improvements in brief bags or carriers for legal and other documents and sundry articles.
14. Kandernath Mondul and Hira Lal Mondul, of Howrah, and Calcutta, for hand wheel bomar presses for pressing of loose jute from two maunds up to the weight of four and a half maunds in bales.

* Compiled from the lists published in the numbers of the *Indian Textile Journal* from November 1906 to November 1907.

15. A. K. Mazumdar, of Dhamrai, Dacca, for hironia or the lady spindle.

16. Manockji Cavasji Petit, of Bombay, for an automatic brake for two-wheeled vehicles drawn by a pair of animals.

17. Kiriti B. Mukherji, of Calcutta, for a hand-machine for cotton-spinning or "Charka."

18. Ganga Singh, of Quetta, for recovering lost articles from inaccessible depths, whether in seas, rivers, wells, artesian borings or vertical Mining Shafts.

19. Radha Kissors Sinha, of Indeswar, Assam, for a fan moved by hot air pressure arrangement.

20. Nawab Hozoor Mirza, of Murshedabad, for improvements relating to suspended rope railways or tramways.

21. Prokash Chunder Chatterjee, of Calcutta, for an improved fly-shuttle loom to be called the "Sree Krishna Loom No. 1."

22. Radha Kissors Sinha, of Uttarbhadra, P. O. Indeswar, for Kerosine gas-store of a syphon arrangement.

23. Rao Bahadur Chervur Krishnachar Subba Rao, of Bellary, for a climax tread powder for man or beast for work in general.

24. Mr. Yusaf, of Meerut, for summer relief.

25. K. G. Subba Row, of Tirukolur, for a pair of cook's tongs.

26. D. S. Guanakan, of Bangalore, for improvement in Izal disinfectant called "Ozu."

27. Thakur Dutta Sharma, of Lahore, for a medicinal compound called Amritdhara.

28. P. Lall, of Mauza Narela, Tehsil Delhi, for a new variety or substitute for tea made from herbs, called "Imrat Sar Fiwan."

29. Dorabjee Burjorjee, Engineer, of Bombay, for an economic bamboo and paper roller for the cotton gin.

30. Khursedjee Sorabjee Jussawala, of Bombay, for a contrivance for developing continuous and even motive power both from tide and ebb waters.

31. A. C. Imbert, of Vizianagram, for improved compressing or baling machinery.

32. Harichand Manclaram and Son, of Bombay, for a padlock without any joint.

33. Gajendra Kumar Paul, of Comilla, for improved box harmonium.

34. Ram Lal Das, of Calcutta, for producing musical tones of all pitches and qualities to be called Suralahari.

35. Ebrahim and Shaik Jaffer, both of Sholapur, for improvements in warping machines.

36. Karter Singh, of Rawalpindi, for a disinfectant to be known as "plunas."

37. Motilal C. Mehta, and the Sayajee Loom Works, Ltd., of Baroda, for improvements in take-up motions for looms.

38. Gangadhar R. Mangrulkar, of Sholapur, for improvements in the manufacture of grass matches.

39. Kedarnath Chakravarti of Kalighat, for a spinning machine to be called "The Bijoy charka."

40. Nil Kunth Nundy, of Calcutta, for a new or improved machine for making hookah tubes and the like.

41. Narain Singh, of Amritsar, for Swadeshi leatherless boots, shoes and slippers.

42. Jotendra Nath Bannerjee, of Calcutta, for johor's mechanical smokeless kerosine lamp.

43. L. K. Kirloskar, of Belgaum, for improvement in hand chaff or fodder cutter.

44. Kanhaiya Lal, of Delhi, for making a perpetual calendar of the Christian era.

45. Bawa Budh Singh, of the Public Works Department, Punjab, for a folding camp punkha.

46. Soruj Bali, of Lucknow, for flour mill.

47. Ashutosh Pollay and Wooma Churun Deshi, both of Howrah, for improvements of hand power jute press.

48. Sorabji Cursetji Arsiwalla, for a safety device for live electric cables.

49. Kartar Singh, of Rawalpindi, for a composition of chemical matter for expelling rats from premises forming an anti-rat preparation to be known as "rat scare."

50. Radhika Nath Saha, of Benares City, for improvements in stylographic, fountain and like pens.

51. Dinsha Pestonji Framji Ghadiate, of Surat, for preventing accidents to life and property caused by the falling of aerial wires carrying electrical currents of high tension.

52. Ishwar Janeswar Khettry, of Sholapur, for improvements in warping machines.

53. Hara Dhan Mandal, of Howrah, for the efficient jute press,

SPECIFICATIONS FILED.

1. Motilal Chotalal Mehta, and the Sayajee Loom Works, Limited, both of Baroda, for improvements in take-up motions for looms.
2. Bonkim Lal Das, of Calcutta, for a cottage or factory loom to be called Bankim's Patent Domestic Loom.
3. Priya Natha Roy, of Darjeeling, for a semi-automatic spinning wheel, being a rustic machine with common material to be called Sarala Charaka.
4. Rama Dayal Fuller, of Aligarh, for improvements in oil lamps.
5. Lalit Chandra, of Assam, for improvements in lamps.
6. Khetramohon Dass, care of L. Deveria, Alipore, for the "Bengal" self-acting brick and the tile-making machine.
7. Pestonjee Cursetjee Mehta, of Bombay, for a new fuel briquette.
8. B. B. Chakravarti, of Benares, for an improved looking roofing tile called "Chakravarti" tile.
9. Akbar Ali, of Ludhiana, Punjab, for a loom with a single shaft for shedding, picking and beating up.
10. Rai Bishambar Nath, of Delhi, for a cheap country oil lamp.
11. Rai Bishambar Nath, of Delhi, for an improved portable stove and bed warmer.
12. Rai Bishambar Nath, of Delhi, for a cheap water-heater.
13. Ram Nath, of Delhi, for a new process (to be called the new Rama process) for reproducing copies of drawings.
14. Y. K. Davda, of Bombay, for improvements in lamp chimneys of mica.
15. Maneckshaw J. Chanjibhoy Mistry, of Bombay, for a detaching device for vehicles.
16. Madan Lall Kapoor, of Peshawar, for hand, treadle or power loom weaving machine.
17. Kander Nath Mondul and Hiralal Mondul, of Howrah, and Calcutta, for hand wheel Bomar Press for pressing of loose jute in one bundle of one and a half maund in weight.
18. Laljee Madhowjee, of Madeji, Road Station, for improvements in clocks.
19. Lakhiswar Ghatak, of Shahapur, for an alloyed gold.
20. Chandra Mohan Roy, of Lucknow, for improved

21. Kartar Singh, of Rawalpindi Cantonment, for mushicide or the signal rat exterminator.

DESIGNS REGISTERED.

1. Miss Nistarini Mitter, of Calcutta, for a pictorial flag showing a tiger, crescent, star, sun, moon, and the words "Bande Mataram" in Deb Nagri character.

2. M. S. Das, of Cuttack, for a tantalusor spirit stand of a snake design.

3. Gordhan Dass, Sarrafi, of Delhi, for a disc for necklaces bearing specified words on each side.

4. Jugal Kishore, of Delhi, for a disc for necklaces bearing specified words on each side.

5. Shadi Ram, jeweller, of Delhi, for a disc for necklaces bearing specified words on each side.

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